THE UNIVERSITY OF QUEENSLAND

AUSTRALIA

Using implicit association to access drug use trajectories of young people: Understanding the different drug use pathways for young people who use illicit substances and investigating the role of implicit identification as a useful indicator of risk of drug dependency

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Bachelor of Commerce, Bachelor of Arts, Psychology Honours

A thesis submitted for the degree of Doctor of Philosophy at

The University of Queensland in 2016

School of Psychology

Abstract

Introduction

Understanding the different drug use trajectories for people who use or are considered *at risk* of using illicit drugs is important to reduce harms associated with severe drug use. This research aims to develop a better understanding of the different drug use pathways for young people by examining how identification with drug use predicts aspects of their future drug use. This longitudinal study tracked young people who use or are *at risk* of using illicit drugs to assess whether implicit and explicit identification with drug use predicts changes in their drug use over time. It also examined whether patterns of drug use such as frequency, recency, and multiple drug use impact the way a person identifies with drugs.

Methods

Two hundred and twenty-eight participants were initially recruited from homeless shelters, youth centres, drug health services, and parks where people who use drugs are known to frequent. Over a 20 month period, 78 of these original participants were recontacted and surveyed again. The survey included an Implicit Association Test that measured implicit identification with drug use and a questionnaire that collected information concerning illicit substance use, social networks, severity of dependence, reasons why people use drugs, and explicit identification with drug use. Ethics approval was obtained from the University of Queensland and University of New South Wales Human Research Ethics Committees. Recruitment was concentrated in the Sydney metropolitan area, a geographical area where a large proportion of people who use drugs are known to congregate.

Results

Participants who used drugs more regularly were more likely to be injecting as a main route of administration, to show greater severity of dependence, to be involved in drug-using social networks, to have encountered significantly more negative consequences as a result of drug use, and to have started using drugs at a younger age. Significant positive correlations were found between explicit and implicit identification and seriousness of drug use, with identification with drug use being stronger among those participants that had used more frequently, more recently, and had used multiple drugs. These results suggest that patterns of drug use are tied up with the identity of the individual and that identification with drug use may be a marker of drug-using behaviour. However, longitudinal regression analyses revealed that neither implicit nor explicit identification with drug use predicted independent variance in the change in frequency, recency, or number of different types of drugs used over time.

Discussion

Implicit identification with drugs was not found to play a causal role in transitioning to more severe drug use over time. Although the findings do not support the research hypotheses, the results show that implicit identification reflects participants' levels of current drug use and mirrors ongoing drug-using behaviour. Future longitudinal research should be designed to capture the more vulnerable and marginalised members of this *at risk* population, with a focus on measuring other variables that relate to entrenchment in a drug-using lifestyle as possible determinants of drug use pathways.

Declaration by author

This thesis is composed of my original work, and contains no material previously published or written by another person except where due reference has been made in the text. I have clearly stated the contribution by others to jointly-authored works that I have included in my thesis.

I have clearly stated the contribution of others to my thesis as a whole, including statistical assistance, survey design, data analysis, significant technical procedures, professional editorial advice, and any other original research work used or reported in my thesis. The content of my thesis is the result of work I have carried out since the commencement of my research higher degree candidature and does not include a substantial part of work that has been submitted to qualify for the award of any other degree or diploma in any university or other tertiary institution. I have clearly stated which parts of my thesis, if any, have been submitted to qualify for another award.

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Publications during candidature

No publications

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No publications included

Contributions by others to the thesis

No contributions by others

Statement of parts of the thesis submitted to qualify for the award of another degree

None

Acknowledgements

This research has been an extremely rewarding journey for me. Although it has been most arduous at times, I would not trade it for something easier, for it has taught me a myriad of life lessons, about myself, my family and about a marginalised population that needs to be supported and destigmatised in the broader community.

My thesis could not have been completed without the constant support and guidance of so many people.

My heartfelt thanks to my three supervisors who have encouraged and guided me every step of the way. To Loren Brener, without your unwavering support and constant reading and re-reading of all the drafts this research would not have been completed. Thank you for your endless supervision and patience, and encouraging me to persist when the finish line seemed impossible to reach. To Courtney and Bill von Hippel, who despite the distance, have constantly been there for me, offering invaluable guidance, advice, wisdom and much needed statistical help. Thank you for believing in me and helping me throughout the journey.

My gratitude to the University of Queensland for awarding me a University of Queensland Research Scholarship, which enabled me to partake of this research and to be a part of this vibrant research community.

To the Centre for Social Research in Health, and Carla Treloar in particular, thank you for offering me the opportunity to work as a research assistant. And to Hannah Wilson, my ex-colleague and friend, your listening ear, statistical knowledge and never ending help and encouragement at any hour will always be remembered.

To NUAA, Wayside Chapel and the other services that opened up their doors to me unconditionally for months on end, allowing me to conduct my research in their centres, I thank you for your kindness and commitment to helping others.

To my darling husband and best friend, your support is always constant and without you there would be no research at all. You are my rock.

And to my three children, my best achievements, who taught me never to give up, this one is for you!

Keywords

drugs, harms, injecting, implicit, identification, self, pathway, trajectories, young, at risk

Australian and New Zealand Standard Research Classifications (ANZSRC)

ANZSRC code: 170113, Social and Community Psychology, 100%

Fields of Research (FoR) Classification

FoR code: 1701, Psychology 100%

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AIHW	Australian Institute of Health and Welfare
HCV	Hepatitis C Virus
IAT	Implicit Association Test
ID	Identification
IDRS	Illicit Drug Reporting System
NUAA	New South Wales Users and Aids Association
NSP	Needle and Syringe Program
SDS	Severity of Dependence Scale

CHAPTER 1 - Trajectories of drug use

Understanding the different drug use trajectories for people who use or are *at risk* of using illicit drugs is important in order to reduce harms associated with more severe drug use. Numerous studies have focused on variables that place young people *at risk* of using hard drugs and have found it to be a complex interaction of biological, psychological, social, and environmental factors (Downs & Rose, 1991; Fuller et al., 2002; van den Bree, Johnson, Neale & Pickens, 1998). However the different drug use trajectories for young people who are considered *at risk* are not well understood nor do we really know why some young people are more likely to transition from occasional drug use to regular use of *harder* drugs. Whilst research has identified several predictors that have been found to place a person *at risk* for long term drug use, these predictors do not explain why different individuals follow different drug use trajectories.

One area that research on treatment and recovery from addiction has focused on is the importance of the identity of the person who uses hard drugs in understanding their recovery from drug use (Gibson, Acquah & Robinson, 2004; Hughes, 2007; Waldorf & Biernacki, 1981). This research on recovery from drug use proposes that the extent to which drug use is or becomes bound up with the identity of the individual may be a significant predictor of movement from occasional to regular drug use. The large body of existing research on the different variables that place young people *at risk* of using hard drugs has not focused on the identity of the person in terms of understanding different drug use patterns over time. Identity (or the way people see themselves) can be looked at both implicitly and explicitly and it is important to consider both aspects to see which of these, if any, are able to predict longer term use or movement to *harder* drug use.

This research aims to develop an understanding of the different drug use trajectories for young people who use illicit drugs. I begin by discussing the harms associated with drug use, the prevalence of drug use in Australia, and the known predictors of drug use, which highlight the importance of studying drug use trajectories. The research then assesses the role identification plays in recovery from addiction and examines whether identification with drug use, both explicitly and implicitly, predicts aspects of drug use and explains movement from recreational use of drugs to use of *harder* drugs.

Harms associated with drug use

Harms associated with drug use place a large economic, social, and financial burden on society, making it essential to better understand and prevent movement into longer term

drug use. Globally illicit drug use takes a considerable toll on society with drug related mortality and morbidity increasing in both developed and developing countries. This places a strain on society, in terms of cost of treatment, loss of productivity, drug-related crime, and incarceration (Burns, 2014; Wodak, 1995). The burden of illness due to illicit drug use worldwide increased by 52% between 1990 and 2010 with dependence on illicit substances accounting for 3.6 million years of life lost through premature death and 16.4 million years of life lived with disability in 2010 (Degenhardt et al., 2013). The health risks of illicit drug use increases with the frequency of use, quantity and type of drug use, duration of drug use, as well as the route of administration of the drug (Barrio et al., 2001; Degenhardt et al., 2013; McKetin et al., 2008). Injecting is associated with greater physical harms than using via other less invasive routes of administration. Currently there are some 27 million people reported to be dependent on drugs with approximately 12.7 million people injecting drugs worldwide (Burns, 2014), however this figure is very likely to be an underestimate of the real prevalence of drug use.

Drug harmfulness, the degree to which illicit substances cause harm, can be measured in a variety of ways, such as dependence, addictiveness, and physical risks. Marijuana, hash and mushrooms are generally considered to be soft drugs and are thought to carry less serious risks than hard drugs. Soft drugs are less inhibiting and addictive than hard drugs, often being defined as causing psychological, but not physical addiction (Kilpatrick et al., 2000). More harmful drugs are referred to as hard drugs and are often linked to a particular route of administration, that being injecting (Gossop, Griffiths, Powis & Strang, 1992; Nordegren, 2002). Heroin, cocaine, meth/amphetamines, prescription drugs being used non-medically, methadone, ketamine, benzodiazepines are all considered to be hard drugs.

Australia has a strong culture of injecting drugs (Ciccarone, 2009; Warhaft, 2008). One of the reasons for this is that white heroin, traditionally found in Australia, is highly water soluble, acidic, and burns at much higher temperatures making injecting the ideal method for administration. In addition, almost all drugs are more effectively absorbed with a more intense rush when injected directly into the blood stream rather than administered through other means (Loimer, 1992; Nasir & Rosenthal, 2009; Swift, Maher & Sunjic, 1999). Hence in Australia, whilst the majority of heroin users initiate heroin use via injecting (Day, Ross, Dietze & Dolan, 2005) those who use other hard drugs long term often eventually move on to injecting as it results in a more cost effective method of using drugs (Tyler, 1995; Nasir & Rosenthal, 2009). The increased high obtained from injecting further fosters greater

dependence on the drug and encourages ongoing and possibly more frequent injecting (Gossop et al., 1995).

The harms associated with hard drug use include psychosis, violent behaviour, overdoses, chronic diseases, infections, injecting-related injuries, and blood borne viruses, particularly HIV/AIDS and hepatitis C (HCV). In Australia, as in other developed countries, the biggest health concern for people who inject drugs is HCV which is a blood borne virus primarily transmitted via the sharing of equipment used to inject drugs. Ninety percent of new and 80% of existing HCV infections are attributable to injecting drug use (Hajarizadeh, Grebely & Dore, 2013; Razalia et al., 2007; Robotin et al., 2004). Around 230,470 Australians are currently living with HCV and it is estimated that liver-related deaths due to HCV will claim more than 650 lives in Australia this year alone (The Kirby Institute, 2015).

Young injecting drug users in particular are at a greater risk than other injectors because they are more likely than older more established users to reuse other people's injecting equipment and more likely to overdose (Bailey et al., 2007; Bryant, 2014; Novelli, Sherman, Havens, Strathdee & Sapun, 2005). In addition young people who inject drugs are less likely to makes use of harm reduction and other healthcare services where they can access medical and social services, including receiving sterile equipment and being tested for HCV (Bailey, Huo, Garfein & Ouellet, 2003; Walker & Reibel, 2013; Wilson, Dean, Biro & Ciarrochi, 2003). Confidentiality breaches, embarrassment, and lack of knowledge of the services are often cited by young people as reasons for not accessing these services (Booth et al., 2004; Kang et al., 2006). As a result of their high risk drug-using practices and the low attendance of health services by young injectors, the Australian Fourth National Hepatitis C Strategy has identified young people as a key priority group in order to prevent the spread of HCV infection among this vulnerable population (Australian Government Department of Health and Ageing, 2014; Roxburgh & Burns, 2015; Stafford & Burns, 2015). Even though research has shown that young people are more likely to engage in unsafe injecting practices (Buxton et al., 2004; Day et al., 2005, Kerr et al., 2009), the prevalence of HCV is still lower in people under the age of 25 compared to injectors overs the age of 36 (Iversen, Topp, Wand & Maher, 2012), presenting a unique opportunity to target intervention programs at young people (Bryant, 2014). Given the high prevalence of HCV in the injecting population, a better understanding of ways to limit movement to *harder* drug use among this group of young users, who have not yet acquired HCV, is necessary to limit the spread of the virus.

Prevalence of drug use among young people in Australia

Routine data collected in Australia suggests that drug use among young people is on the rise, especially with the increase in the use of crystal methamphetamine (street name ice) among young people (Degenhardt, Larney et al., 2016; Stafford & Breen, 2016). Findings from the most recent National Drug Household Survey show that people aged 20–29 are the most likely to use illicit substances (AIHW, 2014). More than one quarter (27%) of people in their twenties reported using illicit drugs in the previous 12 months, with cannabis being the most commonly used drug. Among people age 20-29, 20.8% reported having used cannabis in the last 12 months, followed by ecstasy (8.6%), cocaine (5.9%), and meth/amphetamines (5.7%). Cannabis use is also high across the adolescent age span; among young people aged between 12 and 17 years 15.4% have tried cannabis, 19.2% tranquilisers, 10.6 inhalants and 3.4% amphetamines in the last year (Miller, Bridle, Goggin & Christou, 2012)

The Illicit Drug Reporting System notes particular characteristics associated with young people who use *harder* drugs. The majority reported being polydrug users, multiple drug users, and daily cannabis users (Stafford & Burns, 2015). Polydrug use is the use of two or more illicit drugs at the same time or sequentially and multiple drug use is the use of two of more drugs over a sustained period of time (Bennett & Holloway, 2005). There are several reasons people choose to use more than one drug -- for example to increase the *high*, to reduce side effects, or due to unavailability of a particular drug -- but the synergistic and additive effects of combining drugs increases the risks of accidents, overdoses, and health and mental illness (Lee et al., 2012; Smit, Monshouwer & Verdurmen, 2002). Young people are more likely to experiment with polydrug use and multiple drug use and this further increases the risk of harms associated with drug use (McCabe, Cranford, Morales & Young, 2006; Rosenthal, Mallett, Rotheram-Borus, 2008). Based on recent findings from the Illicit Drug Reporting System (2014), heroin and methamphetamine have remained the two most commonly reported drugs last used, with around half of injecting respondents reporting daily or more frequent injecting. Of note is the significantly higher recent and frequent use of methamphetamine reported in the latest survey among people who inject drugs (Stafford & Burns, 2015). This survey reported crystal methamphetamine users to be younger, unemployed, and likely to use a variety of drugs. Crystal methamphetamine has a high purity and metabolises in the body quicker than other forms of methamphetamines and as such is more addictive than many other drugs (Degenhardt, Sara et al., 2016; Matsumoto et al., 2002,). Dependence on crystal methamphetamine has been linked to an increase in mental illness such as psychosis, may result in violent

behaviour and has also been associated with greater physical harms such as cardiovascular problems among young people as well an increased drug related fatalities (Degenhardt, Sara et al., 2016; Farrel, Masden, Ali & Ling, 2002; Hides et al., 2015; Mcketin, McLaren, Riddell & Robins, 2006; McKetin et al., 2008). The recent extensive coverage of the *ice epidemic* in the media has been aimed at young people and their families with warnings about the serious psychological, physical, social, and financial harms associated with use of crystal methamphetamine. When crystal methamphetamine is used recreationally it is usually smoked, but regular use of this drug quickly leads to dependence regardless of its route of administration (Degenhardt, Sara et al., 2016; Lee, Kay-Lambkin, McKetin & Baker 2008, McKetin, Kelly & McLaren, 2006; McKetin, McLaren & Kelly, 2005). About 10-15% of people who become dependent on crystal methamphetamine and manage to stop using, will relapse within a year (Lee, 2015; McKetin, Kelly et al., 2006, McKetin et al., 2012).

The widespread increase in use of drugs, especially methamphetamines, by young people in the past five years is a concerning trend (Degenhardt, Larney et al., 2016). It is difficult to predict who will continue to use drugs recreationally and who will become dependent on them. This difficulty highlights the need for further research on drug use to identify factors that might limit movement to more serious drug use amongst this group of young people who are not yet entrenched in a serious drug-using lifestyle.

Predictors of drug use among young people

Previous research has focused on factors associated with substance use among young people and has identified several predictors that have been found to place an individual *at risk* of initiation to drug use (Brook, Brook, Richter & Whiteman 2006; Dube et al., 2003; Kaplan, Martin & Robbin, 1984; Kilpatrick et al., 2000). *At risk* in this context can be understood as young people with socio-demographic characteristics that may increase their likelihood of using drugs (Lea, Bryant, Ellard, Howard & Treloar, 2015). Illicit substances are more commonly used among young Australians than the Australian general population and usage tends to occur in greater concentration among those who are socially disadvantaged (AIHW, 2011; Bryant, Ellard, Fischer & Treloar, 2012). Sexual and physical abuse, delinquency, having parents with active alcohol dependence, low educational commitment, exposure to social networks of people who use drugs, and spending time in juvenile detention have all been found to be associated with movement into drug use, frequency of use, and heavy use of illicit drugs (Abelson et al., 2006; Dube et al., 2003; Fuller et al., 2002; Newcomb, Maddahian & Bentler, 1986; Obot, Wagner &

Anthony, 2001). Research suggests that experiencing a greater number of risk factors is associated with increased likelihood of substance abuse (Bry, McKeon & Pandina, 1982; Newcomb et al., 1986). These risk factors will be discussed in more detail below.

Adverse Childhood Experiences

Research suggests that childhood sexual and physical abuse is associated with movement into drug use (Heffernan et al., 2000, Kendler et al., 2000; Ompad et al., 2005). As the number of adverse childhood experiences increases, such as abuse, neglect, and household dysfunction, so too does the risk for developing substance abuse and dependence among young teenagers and adults (Dube et al., 2003).

Dysfunctional family context

Another strong predictor of substance abuse is dysfunctional family relationships and structure. Poor communication, excessive discipline, lack of parental warmth, weak parent-child attachment, and family conflict have been found to predict initiation to drug use (Brook, Brook, Gordon, Whiteman & Cohen, 1990; Mason et al, 2007; Vellerman, Templeton & Copello, 2005). In addition, having parents that are dependent on alcohol and illicit drugs is associated with increased likelihood of usage of illicit substances (Abelson et al., 2006; Obot et al.,2001).

Homelessness

Even though a dysfunctional home environment is a known risk factor, homelessness is even more problematic. Research suggests that living on the streets and in shelters exposes youth to numerous stressors that are directly linked to risky behaviours and substance abuse (Baer, Ginzler & Peterson, 2003; Kipke, Montgomery, Simon & Iversonet, 1997; Milburn et al., 2009). In fact, recent homelessness over and above duration of early homelessness was found to be a significant predictor of drug use (Tompsett, Domoff & Toro, 2013).

Peer networks

Peer networks have been identified as particularly influential in drug use pathways. Exposure to social networks of people who use drugs (Creemers et al., 2010; Hawkins, Catalano & Miller, 1992; Simons-Morton & Chen, 2006) as well as deviant behaviour, delinquency, truancy, and low educational commitment (Bachman, 2008; Oetting & Donnermeyer, 1998; Townsend, Flisher & King, 2007) have also been found to play a significant role in movement into drug use, frequency of use, and regular use of illicit drugs. Socialising with peers that use drugs and being in an environment where drugs can

easily be obtained encourages positive attitudes towards drugs and increases the likelihood of drug use (Haller, Handley, Chassin & Bountress, 2010).

Psychological Risk factors

Low self-esteem, depression, psychological distress, and low sense of social responsibility are other factors that have been found to place a person *at risk* of the initiation to drug use (Boden, Fergusson, & Horwood, 2008; Kandel, 1982; Wild, Flisher, Bhana & Lombard, 2004). The use of drugs may be seen as a self-medicating or a coping mechanism to deal with feelings of despair and anxiety.

Age of first use

If initial drug use occurs at a young age it is more likely to lead to continued use and dependence (Grant & Dawson, 1998; Johnson, 2001;Toumbourou & Catalano; 2005). The risk of developing drug problems is greater for those whose initiation into drug use begins during pre-adolescent and early adolescent years (Chen, Storr & Anthony, 2009). Hence how old a person is when they first use drugs may be an important predictor of future ongoing illicit drug use (Debeck et al., 2013; Fuller et al., 2002; Obot et al., 2001).

Movement to *harder* drug use

Most people who start using drugs occasionally never think they will end up injecting. Transitioning to injecting is a relatively new field of research which seeks to identify groups *at risk* of moving into injecting drug use with the focus on behavioural characteristics, social networks, adverse life events, and circumstances surrounding initiation (Fuller et al., 2002; Lea et al, 2015; Roy, Nonn & Haley, 2008). As injecting drug use is a common route of administration of *hard* drugs in Australia, and given the harms associated specifically with injecting, it is important to understand factors that predict movement to *harder* drug use among young people. Research indicates that factors that increase the risk of transitioning from casual drug use to injecting drug use are a function of individual characteristics as well as the influence of social networks (Fergusson, Boden & Horwood, 2008; Neaigus et al., 2006; Roy et al., 2008).

Many of the risk factors described earlier that are associated with initiation to drug use are also found to be predictors of movement to injecting. Adverse childhood experiences, childhood emotional and physical abuse, exposure to physical violence, and homelessness have been identified as predictors of transitioning to injecting drug use (Fuller et al., 2002; McCrystal, Higgins & Percy, 2006; Bryant, Ellard, Morris, Fischer & Treloar, 2013). Additionally, research suggests that young people who have encountered

social disruptions or who have engaged in misbehaviour before age 16 such as getting into fights, truancy, and juvenile arrests as well as dropping out of school and showing low educational commitment are more likely to initiate to early transition to injecting (Crofts, Louie, Rosenthal & Jolley, 1996, Fuller et al., 2002, Obot & Anthony, 2000; Bryant et al., 2013). Early sexual behaviour, particularly sexual encounters prior to age 14 is also associated with transitioning to injecting (Fuller et al., 2001; Roy et al., 1998, 2003). In addition, early sex-working among woman in particular was found to significantly predict transition into injecting (Fuller et al., 1999, 2002). Adolescents who start to use drugs at a young age are more likely to become polydrug users and progress more quickly to injecting (Fergusson & Horwood 1997; Grant & Dawson, 1998; Wu & Howard, 2007). Abelson et al. (2006) further identified that early transition to injecting was associated with having other family members who also inject.

Additionally peer influences for young people are particularly powerful in understanding patterns of drug use, (Bryant et al., 2012; Fuller et al., 2003, 2005; Harocopos, Goldsamt, Kobrak, Jost & Clatts, 2009). Peer pressure in particular is noted as an important influence in transitioning to injecting, with a desire to experiment in a social context often reported as a reason for injecting (Bailey et al., 2007; Bryant & Treloar, 2007; Bryant et al., 2013). Day et al. (2005) provide evidence of the social nature of injecting as they found that more than one third of their sample of young heroin users had taught another person, usually a friend, to inject heroin with females often being initiated to injecting by their male sex partner (Bryant & Treloar, 2007; Crofts et al., 1996; Rhodes & Quirk, 1998; van Ameijden, Van Den Hoek, Hartgers & Coutinho, 1994). This research suggests that female initiation to injecting is strongly influenced by relationships with injecting partners, especially romantic-sexual partners.

Drug pathways

The section above outlines factors that may place a person *at risk* of initiation to drug use and ultimately transitioning to *hard* drug and injecting drug use. While these variables provide some evidence regarding who may transition to serious drug use, they do not explain why two people facing the same set of social or personal circumstances who are both exposed to a similar set of risk factors may follow different drug pathways in terms of their drug use.

In an important major longitudinal study of drug use among adolescents in England, Parker et al. (1995) tracked over 700 young people for more than five years. They found that recreational drug use among young people had increased in popularity and become a

relatively normal part of young people's social life. However this research focused on recreational drug use and not the use of *hard* drugs. Longitudinal research on young people who are *at risk* or using *hard* drugs is limited and more information is required to better understand these drug use trajectories.

It is difficult to conduct longitudinal research assessing drug use trajectories of *at risk* youth for a number of reasons. Young people who are *at risk* are often a difficult group to study longitudinally because they tend to be transient in nature, making long term data collection very challenging. They may often be unreliable in maintaining contact and/or may be homeless, with contact details that tend to change. In addition, the illegality of most drugs as well as stigma and discrimination surrounding drug use and fears of breach of confidentiality means young people who are using drugs are often unwilling to speak openly about their drug practices. Thus, for a host of pragmatic reasons, it is easier to collect data from people who are already in treatment or who have ceased to use drugs than from those who are currently using drugs or who are *at risk* and whose pathways are still not known.

Although we do not know exactly what transitions people into habitual drug use, we can perhaps extrapolate from the data showing what transitions people out drug use. Identity has been found to be important in recovery from drug use, suggesting that it may be important in the development of entrenched patterns of drug use. Several studies have focused on the issue of identity when examining recovery from dependent drug use, and discussed the necessity for disentangling individuals' identity or sense of self from their drug use (Biernacki, 1986, McIntosh & McKeganey, 2000; Waldorf & Biernacki, 1981; Waldorf, 1983). These authors suggest that people's identity becomes bound up with their drug use and to stop using drugs it is necessary to separate this identity. In a qualitative, exploratory study on the social psychological process of untreated recovery of dependent users, Waldorf (1983) found that once the decision to stop using had been made, new interests, social networks, and identities needed to be created to sustain this decision to stop using drugs. The sociological literature suggests that an important part of the recovery from the addiction process is the reconstruction of a nonuser identity. According to a study by McIntosh and McKeganey (2001), allowing the person to construct a new identity by focusing on reinterpreting their drug-using lifestyle in a destructive, negative, light is an essential part of the recovery process. Qualitative research that has addressed these ideas, has found the reconstruction of a new non-addict identity central to the

recovery process, emphasizing the link between recovery from drug use and changes in identity.

This prior, largely qualitative research raises the possible importance of identity in understanding transitions to more entrenched drug use (Gibson et al., 2004; Hughes, 2007; McIntosh & McKeganey, 2000). Gibson et al. (2004) refer to *entangled identities* whereby people take on a drug-using identity made up of routines and habits directly related to their drug use, which replaces their non-user identity, in some cases leaving them unable to even remember having a non-user identity. Such data suggest that the way a person identifies with their drug use may be important in understanding various aspects of their drug use, such as increased frequency of use or greater entrenchment in a drug-using lifestyle. Findings from the literature cited above suggests that the extent to which drug use is bound up with the identity of the individual may be a significant predictor of their movement from occasional drug use to regular use of *harder* drugs. Almost all of the research cited above is qualitative and there is little quantitative research that has examined the importance of identity in understanding drug use or recovery from drug use. Based on the literature it may be that those who identify more strongly with their drug use are more likely transition into *harder* drug use. The goal of this thesis is to examine the role that identification with drug use has on changes in drug use over time using quantitative methods. By tracking young people over time, this research aims to examine how identification with drug use relates to drug use pathways focusing on frequency, recency, and severity of use.

CHAPTER 2 - Implicit identification with drug use

Traditional models in social psychology assumed that attitudes operated on a conscious level (Allport, 1935; Katz & Braly, 1935; Thurstone, 1931). Over the past 30 years, there has been considerable evidence to the contrary that social behaviour and human cognition often operates outside of conscious control and that people's attitudes need not be at a level of conscious awareness to have an effect on behaviour (Bargh & Chartrand, 1999; Fazio, Jackson, Dunton & Williams 1995; Jones, Pelham, Mirenberg & Hetts, 2002). Implicit attitudes are the unconscious traces of previous experiences that can influence social behaviour, feelings, and perceptions (Greenwald & Banaji, 1995). Measures of implicit attitudes tap into cognitions that may not be accessible at a conscious level and may be different from the publicly expressed opinions and beliefs. With the advent of techniques to measure implicit attitudes, such as Semantic Priming Measures (Wittenbrink, Judd & Park, 1997), the Go/No Go Association Task (Nosek & Banaji, 2001), Sequential Priming Tasks (Fazio, Sanbonmatsu, Powell & Kardes, 1986; Gawronski, Hoffman & Wilbur, 2006) and the Implicit Association Test (IAT) (Greenwald, McGhee & Schwartz, 1998), social psychology witnessed a resurgence of research in this field of implicit social cognition. These measures have been used extensively to examine concepts such as attitudes, stereotypes, self-identity, and self-esteem that may differ at an explicit level (Cunningham, Nezlek & Banaji, 2004; Nosek et al., 2007; Nosek & Riskind, 2012).

By using implicit association measures to assess the associations that may exist outside of conscious awareness and control, researchers can overcome problems such as when participants are motivated to control their responses or simply may not know the answers (Fazio & Olson, 2003; Strack & Deutsch, 2004; Wilson, Lindsey & Schooler, 2000). For example, responses may be contaminated by social desirability bias whereby participants respond in a way that is overly positive about themselves or in a way that is intended to represent themselves more positively from a social perspective (Greenwald, Poehlman, Uhlmann & Banaji 2009; Paulhus & Reid, 1991). Self-report measures allow individuals to mask their true feelings and prejudicial attitudes on sensitive topics such as racism and stereotyping (Dovidio, Gaertner & Validzic, 1998; Egloff & Schmukle, 2002; Fazio & Olsen, 2003). For example, individuals can fake answers on explicit measures to hide their prejudicial feeling towards homosexuality, but were not able fake responses on an implicit measure (Banse, Seise & Zerbes, 2001). In other situations participants may be unaware of or simply unable to answer what is actually being asked of them in an explicit attitude task. In some instances, people are not able to accurately introspect (Nisbett & Wilson,

1977). This may result in people making inaccurate assumptions about their own attitudes (Bargh, Chaiken, Govender & Pratto, 1992; Greenwald & Banaji, 1995; Jones et al., 2002). This inaccurate introspection or limited awareness is not intended to deceive, and often the person is confident about the accuracy of a response even though it may be incorrect. According to Nisbett and Wilson (1977) people are motivated to construct a plausible explanation for their thoughts or behaviour, but in reality they are often inaccurate, misinterpreted, or guesses. In order to overcome this problem of accurately knowing why people feel and behave the way they do, it is necessary to tap into these unconscious processes.

Implicit Association Test

The Implicit Association Test (IAT) was developed by Greenwald et al. (1998) and has become the most well-known and commonly used measure of implicit attitudes. The IAT has been shown to have good reliability, internal consistency and construct validity (Bosson, Swann & Pennebaker, 2000; Greenwald & Nosek, 2001; Lane, Banaji, Nosek & Greenwald, 2007), as well as being resistant to known problems faced by self-report measures (Banse et al., 2001; Egloff & Schmukle, 2002). The IAT has been used to examine a variety of concepts such as stereotypes (Nosek, Banaji & Greenwald, 2002; Nosek et al., 2009), prejudice (Dovidio et al., 1998; Kawakami, Dion & Dovidio, 1998), anxiety (de Jong, Pasman, Kindt & Van den Hout, 2001; Egloff & Schmukle, 2002), eating disorders (Roefs & Jansen, 2002), and self-esteem (Greenwald & Farnham, 2000). The IAT has also been shown to predict current and important social behaviours better than explicit measures (Nock & Banji 2007a, 2007b; Nock et al., 2010).

The IAT measures implicit associations by assessing the strength of an association between target concepts and negative or positive attributes (Greenwald et al., 1998). The strength of association is measured in terms of the response times in a computer-administered categorisation task. A typical IAT involves a series of tasks, wherein an individual is asked to categorise concepts as rapidly as possible. This test is based on the assumptions that reaction times are quicker when positively associated concepts share the same response key than when concepts that share a response are negatively associated or not associated. For example faster responses for White + positive / Black + negative as opposed to White + negative / Black + positive would indicate positive feelings towards Whites and/or negative feelings toward Blacks (Greenwald et al., 2009).

Implicit associations and drug use

The majority of work on transition into regular drug use relies on explicit, self-report measures. It may be that these explicit measures are not able to tap the attitudes and feelings people have about their drug use, especially given the social stigma surrounding heavy drug use. The stereotyping of people who inject drugs as “junkies” and non-productive, socially deviant members of society has led to the stigmatisation of and discriminatory behaviour towards people who use heavy drugs (Elliott & Chapman, 2000; Goffman, 1963; Paterson, Backmund, Hirsch & Yim, 2007). These negative attitudes towards people who inject may become internalised and affect the way people see themselves (Crocker, Major, Steele, Gilbert & Fiske, 1998; Gilmore & Somerville, 1994). Literature shows that this stigma (internalised and enacted) has a significant negative influence on the emotional, mental, and physical well-being of the individual (Link, Struening, Rahav, Phelan & Nuttbrock, 1997; Sayles, Wong, Kinsler, Martins & Cunningham, 2009; Young, Stuber, Ahern & Galea, 2005). The ongoing stigma faced by people who use hard drugs may impact their willingness to openly discuss and be honest about their drug-using behaviours, and they may simply be unaware of or unable to accurate reflect on their identification with drugs. In order to overcome this potential problem, it may be necessary to measure implicit identification with drug use.

Over the past decade the use of implicit measures in research on addiction has increased, providing a greater understanding of patterns of drug use and recovery. Several studies have looked at the role that implicit cognitive processes play in alcohol consumption. Both implicit attitudes towards and identification with alcohol seem to play a role in alcohol consumption, with people who have positive implicit attitudes towards alcohol more likely to consume more alcohol (Wiers, van Woerden, Smulders & de Jong, 2002, Wiers, van de Luitgaarden, van den Wildenberg & Smulders, 2005, Thush & Wiers, 2007). Heavy and light drinkers also differ in their implicit arousal toward alcohol, with heavy drinkers holding stronger implicit association between alcohol and arousal and weaker implicit sedation associations. Research further shows that implicit identification with alcohol is associated with future risky drinking behaviour (Casey & Dollinger, 2007; Conner, Warren, Close & Sparks, 1999; Lindgren et al., 2013; Wiers et al., 2002). For example, college students who show a greater implicit identification with alcohol are more likely to consume increased amounts of alcohol and have more alcohol-related problems (Lindgren et al., 2013). Perhaps implicit identification with drug use could also have a powerful predictive influence on drug use pathways and movement to harder drug use over time.

Extending this work from alcohol to drug use, researchers have assessed the role implicit identification has on patterns of drug use, particularly in relation to treatment outcomes (Brener, von Hippel, & von Hippel, 2012; Rooke, Hine & Thorsteinsson, 2008; Wiers & Stacey, 2006). Among participants in a treatment facility, Brener et al. (2012) found a correlation between implicit identification with heroin and severity of dependence. Individuals who were in the treatment facility for heroin use, showed a stronger implicit association between self and heroin than those who were at the residential rehabilitation centre for alcohol use. This study suggests a possible link between drug of choice and implicit self-identification that may provide new understanding of pathways of use. Greater implicit identification with drug use seems to predict dependency and severity of drug use. At the same time, greater implicit associations between the self and drug use might emerge from more frequent drug use and entrenchment in a drug using network. The possible cyclical relationship that exists between seriousness of drug use and implicit identification with drugs may be self-perpetuating with those who implicitly identify with their drug use becoming more frequent users and those who use more frequently identifying more with their drug of choice. These studies point to the importance of implicit cognitions, especially in a sensitive and highly stigmatised context of drug use. Given these findings it is conceivable that implicit identification with drug use may be a key factor in understanding individual patterns of drug use over time.

By extrapolating from data showing what transitions people out of drug use, we might gain a better insight into what transitions people into drug use. Implicit identification with drug use has also been shown to play a role in determining the amount of time people are willing to spend in residential rehabilitation programs. Wolff, von Hippel, Brener and von Hippel (2015) found that implicit measures of identification with drug use were able to predict duration in rehabilitation when explicit measures of identification were not predictive. This finding adds to the body of evidence suggesting that implicit identification with drug use may be important in understanding transitions to drug use, but the role of identification as a predictor of drug use pathways has not yet been examined quantitatively at either an explicit or an implicit level.

Despite the absence of predictive work in the domain of drug use, there is evidence that implicit attitudes can predict future behaviour. A landmark study by Nock et al. (2010) found that implicit attitudes accounted for unique variance in future suicide attempts beyond other measures such as self-reported suicide ideation, prior number of suicide attempts, and mood disorders. If implicit identification with death is able to predict suicidal

behaviour, then the possibility exists that implicit identification with drug use might be able to predict ongoing pathways of drug use and abuse. Implicit identification with drug use might be useful in predicting the choices people make that lead to drug dependency.

Conclusion

Previous research has identified several predictors that place an individual *at risk* of initiation to drug use and of transitioning to harder drug use for young people (Bryant et al., 2012; Fuller et al., 2002, Heffernan , 2000;Lea et al., 2015; Rice et al., 2005). However, what remains largely unexplained is why some individuals who are considered *at risk* of illicit drug use go on to more frequent and regular use while others do not. Previous research in treatment and recovery from drug use emphasises the link between drug use and identity and suggests that the identity of an injecting drug user might be an important link to various aspects of their drug use (Biernacki, 1986; Gibson et al., 2004; Hughes, 2007, McIntosh & McKeganey, 2000). This research has until now focused on the explicit identity of the user when trying to understand the different pathways of use and recovery. For some people, the use of alcohol and drugs becomes an important part of the way they see themselves. Their views of themselves are tied up with their drug-using behaviour, routines, and lifestyle. This identification with drug use may differ at a conscious and unconscious level of awareness. Thus, it is possible that implicit identification with drugs may be a useful tool in predicting various aspects of future drug use. This study aims to explore the possibility that identification with drug use is a significant and independent predictor of movement from recreational to habitual use of drugs over time.

Outline of the research

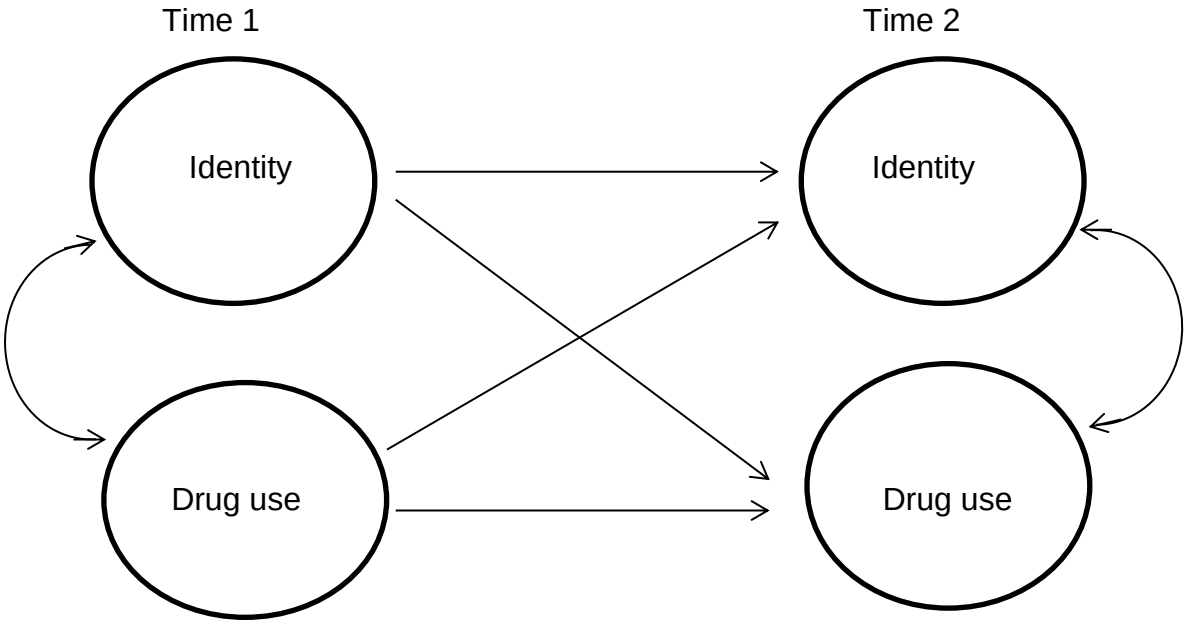
Based on the theory outlined above and in Chapter One, the following was hypothesized:

1) Implicit associations between self and drug use would be stronger among people who use harder drugs regularly than among people who use softer drugs recreationally.
2) Participants who showed an implicit association between self and drug use would show an increase in the frequency and recency of their drug use.
3) Increased frequency/recency of drug use would be associated with stronger implicit associations between self and drug use over time.
4) Participants who showed a strong implicit association between self and drug use, would show an increase in use of multiple drugs over time.

CHAPTER 3 - Methodology

This research examined whether an individual's identification with drug use can predict aspects of their future drug use, such as their movement from use of recreational drugs to use of harder drugs and/or injecting as a main route of administration. It is also examined whether patterns of drug use such as the frequency, recency and multiple drug use, may impact the way a person implicitly identifies with drugs. The goal of the study was to track young people longitudinally who were either currently involved in illicit drug use or *at risk* of initiating illicit drug use, to assess the association between their implicit and explicit identification with drug use and change in their drug use over time (see Figure 1).

Figure 1: Analysis to assess association of identification with drug use over time



Sample

Potential participants who met the following criteria were invited to participate in the study: (1) aged 16 to 28 years, (2) using illicit substances or considered to be *at risk* of using, which was defined by the known predictors of being homeless, living on the streets or in shelters for at least three nights in a row over the past 12 months and/or having close friends or family members that use drugs (Lea et al., 2015). Two hundred and twenty-eight participants took part in the first phase of the research. Nine participants (3.9%) had never used illicit substances but still met the criteria for being considered *at risk* as they were either living in shelters or were homeless. Of the 228 initial participants, 78 were successfully recruited for the follow up session during the course of a twenty month period. The average time lag between completion of the measures at Time 1 and Time 2 was 5.5

months, and ranged from 61 to 594 days between the initial and follow up testing session (*M* = 164 days, *SD* = 113.5 days). All measures were collected on a laptop computer with the researcher present. Participants were reimbursed $25 for survey completion at each time point.

The mean age of participants, approximately 22 years, was similar at Time 1 and Time 2 with the average age of first use of drugs being 14 years. More than half the participants in both surveys were male. Just over half the respondents had completed no more than year 10 of schooling and just over half relied on benefits as their main form of income. Approximately half the participants reported injecting as their main form of administration of illicit substances. See Table 1 for additional demographics and participant characteristics.

Table 1: Participant characteristics

	Time 1 n = 228	Time 2 n = 78
Age, M (SD)	22.36 (3.68)	22.59 (3.64)
Age of first use, M (SD)	14.3 (3.15)	14.52 (2.61)
Gender	%	%
Male	65.8	65.4
Female	29.8	29.5
Transgender	3.9	3.8
Intersex	0.4	1.3
Highest level of education	%	%
Primary	9.2	14.1
Up to year 10	57	56.4
Up to year 12	18.4	14.1
Diploma/trade/university	15.4	15.4
Main source of income	%	%
Benefits	54.8	52.6
Full time work	5.3	5.1
Part time/casual/contract	19.3	16.7
Student allowances	8.3	6.4
Dependent on parents	3.1	3.8
Illegal/crime	2.2	3.8
No money/no income	3.1	7.7
Other	3.9	3.8

Main route of administration of illicit drugs	%	%
Smoking	42.5	50
Injecting	52.7	47.4
Snorting	1	1.3
Swallowing	3.9	1.3

Recruitment

Prior to commencing the research, ethics approval was obtained from the University of Queensland and University of New South Wales Human Research Ethics Committees. Recruitment sites for the study were concentrated around the Sydney metropolitan area, a geographical area where a large proportion of people who use drugs are known to congregate. Young people *at risk* of drug use are known to be hard to reach through traditional health and harm reduction services and they tend to be less willing than older people to talk about their risk practices for fear of getting in trouble with the law (Bryant et al., 2012; Sears, Guydish, Weltzien & Lum, 2001). Additionally, young people are unlikely to attend health services of any form (Booth et al., 2004; Youth Affair Council of WA, 2006). Hence there are limited facilities that provide a point of access to young people who use drugs. As a result, the strategy for data collection involved extensive networking through non-traditional means such as homeless shelters, youth centres, drug health services, parks, and word of mouth. Because of the known difficulties involved in recruiting this type of sample, much of the initial recruitment centred on building up trust with young potential participants and networking with them. Word of mouth and snowballing proved to be the best way of recruitment, but was a slow and painstaking process. In addition, young *at risk* participants are very transient, living in temporary accommodation, shelters, on the streets, or in custodial settings. They are often unemployed, or not at school, and their contact details change over time. Hence tracking participants for the follow up survey proved extremely difficult and time-consuming.

Service directors of five relevant youth organisations and one Needle and Syringe Program (NSP) were contacted, informed of the study and agreed to be involved to assist in recruitment. Some of these youth organisations offer shelter and food to young people on a temporary basis whilst others provide a safe place for young marginalised people to have access to recreational, health, harm minimisation, and welfare services. Staff at the various services were encouraged to inform their clients about the study, and to ask those interested in participating a series of questions to ensure they met the criteria. I attended the different services throughout the process to assist with recruitment of eligible

participants and to recontact them. In addition to recruitment through these services, participants were recruited through non-traditional means. For example, I spent several months loitering in parks, train stations, and communal areas where eligible participants could be found. By establishing trust with potential participants and with assistance from those participants who had taken part in the first phase of the research, over a twenty month period the sample groups for both phases were collected.

Procedure

Once a person agreed to participate, I outlined the aims of the research and obtained written informed consent from them. I administered the survey to participants on a laptop computer in a quiet space, and was available to answer questions. The survey took approximately 30 minutes to complete. Participants who completed the survey were asked whether they would be willing to complete a follow up survey in approximately 3 months' time. If they consented, they were asked to provide their name, contact telephone number or email address. To maximise the likelihood that these participants could be recontacted for the time 2 data collection, they were also asked to provide the contact details of a close friend or relative as another means to find them for the follow up survey.

Measures

Implicit association Test

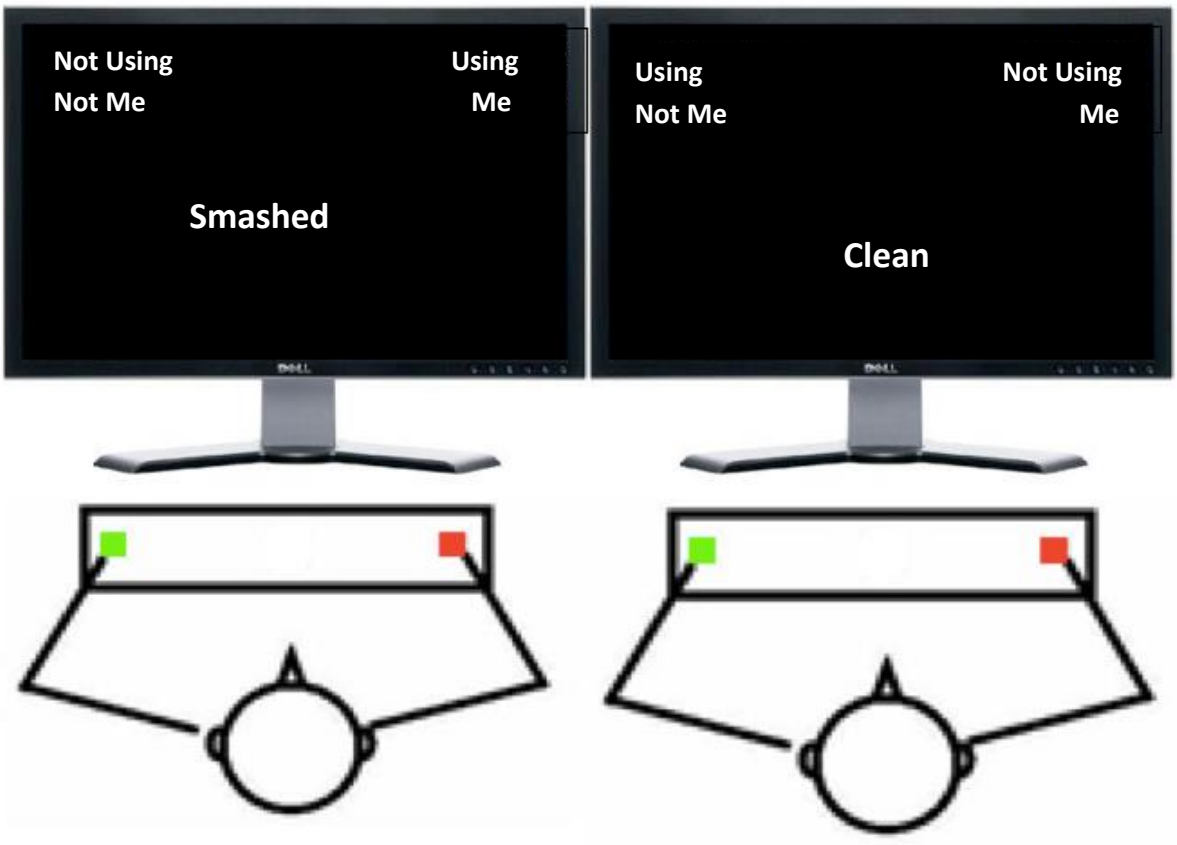
An Implicit Association Test (IAT) (Greenwald et al, 1998) was used to measure implicit identification with drug use. An IAT involves a series of discrimination tasks, wherein two concepts or a concept and attribute are introduced in the first two steps (e.g., Black/White in one task and positive/negative valence in the next task). Categories for each of these stimuli are assigned to a left or right key on the keyboard (e.g., by pressing the E and I keys). In the middle of the screen a word or picture that is typically associated with the categories appears (e.g., faces of Black/White people or words such as "sunshine" or "vomit") and the person is asked to assign the word into the appropriate category by pressing the appropriate left-hand or right-hand key. The compound task involves sorting both concept and attribute to the left and right where each side has two categories assigned to it (e.g. Black/negative and White/positive). In the next compound task, there is opposite pairing of the concepts and attribute (e.g., White/negative and Black/positive). The IAT then compares the relative times for sorting these concepts. The basic assumption is that the more closely associated the two concepts are that are assigned to the same response key, the more rapidly one should be able to respond. By measuring strength of automatic associations, the IAT is able to measure private attitudes that we

may not be willing to share, as well as attitudes that we may not be aware that we hold. Research on the psychometric properties of the IAT have shown good internal consistency, test-retest reliability, predictive validity, convergent and discriminant validity (Egloff & Shmukle, 2002; Greenwald & Farnham, 2000; Greenwald & Nosek; 2001; Greenwald, et al, 2009; Lane, et al, 2007).

The IAT used in this research was adapted from one used in prior research by Wolff et al. (2015). Their IAT was pre-tested with eight staff members at the New South Wales Users and Aids Association (NUAA). NUAA is as an independent, user-driven, community-based organisation that advocates for people who use drugs (particularly those who inject drugs), and was established by a group of drug users, their friends, and families. The staff members, all either current or past drug users, completed the task with the researcher in the offices at NUAA. They commented on the choice of words in the instrument and notes were taken. The pre-test revealed that *smashed* and *wasted* were suitable words strongly associated with drug use and *clean* and *sober* were suitable words associated with not using drugs.

The IAT consisted of seven steps: in the first step participants completed 20 practice trials in which they classified words relevant to identity (*I, myself, my*, vs *they, them, their*) as quickly as possible, with the “E” key being pressed when a word belonging to *Not Me* appears and the “I” key when a word belonging to *Me* appears. Next they completed 20 practice trials to classify the words associated with drug use (*smashed, wasted*, vs *clean, sober*) which were labelled as *Not Using* on the “E” key and *Using* on the “I” key. The words relating to identity and drug use were then randomly ordered and participants completed the two classifications simultaneously with the “E” key being pressed for words that were related to *Not Using* and *Not Me* and the “I” key for words associated with *Using* and *Me*. After 20 practice trials with this compound task, participants then completed a block of 70 such trials. The key assignments were then switched so that participants then completed another 20 practice trials with drug-use words, but this time the “E” key was pressed for *Using* and the “I” was pressed for *Not Using*. The critical phase then occurred when participants were asked to respond to Using and Not Me words on one key and *Not Using* with “Me” on the other key. Participants completed 20 practice trials with the switched combination of *Using* being paired with *Not Me* on the “E” key and *Not Using* and *Me* on the “I” key. Finally the participants complete a block of 70 such trials (see Figure 2).

Figure 2: Example of the IAT



The left screen is an example of the pairing task in stages 3 and 4 while the right screen is an example of the pairing in stages 6 and 7.

Scoring the IAT

When scoring the IAT, response times associated with incorrect answers (17% of all scores at Time 1, 14% at Time 2)[1] were removed (as in von Hippel, Brener, & von Hippel, 2008; Wolff et al., 2015). Response times were then winsorised so that scores less than 300msec (1.5% of all scores at Time 1, .7% at Time 2) were set to equal 300msec and scores that were greater than 4 seconds (1% of all scores at Time 1, 3.9% at Time 2) were set equal to 4 seconds. This scoring allows for control on excessive slowness or excessive speed from participants by recoding latencies outside the upper and lower boundaries to the boundary values of 300msec and 4 seconds. To create an IAT score from these adjusted response latencies for each participant, the procedures of Greenwald, Nosek and Banaji (2003) were followed, such that the mean response time when *me* was paired with *using* was subtracted from the mean response time when *me* was paired with *not using*, and this difference score was then divided by the overall standard deviation. The result of

[1] One participant was eliminated who had an average accuracy of less than 60%.

this scoring procedure is that higher numbers indicated a stronger implicit association between self and drug use (indicating that people respond more rapidly when *me* is paired with *using* than with *not using*).

Questionnaire

The questionnaire was pretested with the same eight NUAA volunteers who pretested the IAT and was altered slightly to incorporate their comments and suggestions, which focussed on removing any ambiguities and better reflecting the vocabulary of a drug user. Participants completed the questionnaire on the laptop computer. The questionnaire was designed to collect information regarding illicit substance use, age of first drug use, frequency of drug use, recency of drug use, multiple drug use in the last 12 months, as well as questions about drug use among their friends, and difficulties associated with drug use (such as trouble with police or at school). Three scales were included that were designed to measure severity of dependence, understanding reasons that people use drugs, and explicit identification with drug use. The scales are outlined in more detail below. Demographic data were also collected.

Severity of dependence (SDS)

The Severity of Dependence Scale (Gossop et al., 1995) is a five item scale used to measure the degree of dependence, anxiety, and impaired control over use of illicit substances in the last month (e.g. *Over the last month, did you wish you could stop using permanently?*; see Appendix 1). Responses were provided on a 4 point scale (0-3) from *never or almost never* to *always or almost always* with higher scores indicating greater dependence on illicit substances. Internal reliability in this study was found to be good (Time 1 administration; α =.78, Time 2 administration; α = .82).

Functions for Substance Use Scale

There are a number of different motivations that people cite for using drugs, from celebrating with friends to avoiding unpleasant emotional states (Christo, 1998; McKay, Murphy, McGuire, Rivinus & Maisto, 1992; Parks & Kennedy, 2004). This survey included seven questions that had been adapted from a 17-item Functions for Substance Use Scale (Boys, Marsden & Strand, 2001) that examined the reasons young people give for using drugs. Participants were asked if they had ever used a drug to fulfil each specific function. The original scale covered five domains of reasons for substance use, namely changing mood, physical effects, social purposes, to facilitate activities, and to manage effects from other substances. The scale used in this study focused on two of the domains: 1) changing

mood and 2) social purposes as a significant association between these two domains and frequency of drug use has been found by Boys et al. (2001). Respondents were asked whether they had used illicit drugs to fulfil a specific purpose such as changing mood – for example, *Using drugs makes me feel better when down or depressed* -- or for a social purpose – for example, *Using drugs makes me feel more confident or more able to talk in a social situation* (see Appendix 1). These questions were responded to on a 7-point scale from strongly disagree (1) to strongly agree (7), with higher scores being indicative of drugs being used to enhance social interaction and mood. The scale showed good reliability at Time 1 (α=.85) and Time 2 (α=.84).

Explicit identification scale

A nine item scale designed to measure explicit identification with drug use was included in the survey. This scale was adapted from the Smoker's Self-concept Scale and the Abstainer Self-concept Scale both developed by Shadel and Mermelstein (1996). Participants were asked the extent to which they agreed or disagreed with items designed to measure explicit identification with drug use - for example, *Using drugs is part of the way I see myself*, and, *It's easy to imagine myself as someone who doesn't use drugs at all* (see Appendix 1.) These questions were responded to on a 7-point scale ranging from strongly disagree (1) to strongly agree (7) with higher scores indicative of stronger explicit identification with drug use. The scale showed good internal reliability at Time 1 (α=.84) and Time 2 (α=.85).

Peer networks

Research suggests that peer networks are particularly influential on drug use pathways (Bryant et al., 2012; Cook, Bauermeister, Gordon-Messer & Zimmerman, 2013; Fuller et al., 2005; Treloar et al., 2003). Four questions concerning friends using drugs were included in the survey to measure the influence of peer networks on drug use and to assess whether implicit and/or explicit identification with drug use predicted variance in drug use over and above peer networks. Items were adapted from different studies to best reflect the influence of peer networks on drug trajectories. Two of the questions assessed association with peers who use drugs, *How many of your friends inject drugs at least once a month?* and *How many of your friends use (but do not inject) drugs at least once a month* (Rice et al., 2005). Responses were provided on a 5-point scale, ranging from *none of my friends* to *all of my friends*. There was also a two item scale that measured perceived support for drug use by peers. Respondents were asked *How do you think your close friends would feel about you using drugs regularly?* and *How do you think your close*

friends would feel about you using drugs occasionally? (Cook et al., 2013). Responses were provided with four different response options, which were; *don't know*, *disapprove*, *neither approve nor disapprove*, and *approve*. This two item scale showed good internal reliability at Time 1 (α=.86) and Time 2 (α=.72).

Negative consequences

Negative consequences of drug use are important to consider because research suggests that having been punished for drug use predicts greater future drug use (Kaplan & Johnson, 1991; Kaplan & Fukurai, 1992). Two questions were included in the survey that measured negative consequences of use of illicit drugs. These two questions assessed whether their drug use had ever led to arrest, close calls with police, or trouble with school authorities, *Have you either had a close call with police or been arrested because of your use of drugs?* and *Have you lost your job or been in trouble on the job because of using illegal drugs, or been in trouble with teachers or school authorities because of it?*. Each item could be answered as *no* = 0 or *yes* = 1.

Questions on patterns of drug use

To measure patterns of drug use, questions around drug of choice, types of drugs used, and frequency and recency of use were included in the survey. Participants were asked if they had ever, even once, used an illicit substance. The nine participants who responded that they have never used illicit substances skipped all further questions concerning patterns of drugs use. In order to compare drug-using patterns and behaviour for those participants that inject verse those participants that use via other forms of administration (smoking, snorting and swallowing), remaining participants were then asked if they had ever injected illicit drugs. To measure frequency of drug use, participants were asked *In the last 12 months, did you use illicit drugs and if so how often?*. Responses to this question were provided on a 7-point scale ranging from *not in the last 12 months* to *every day*. To measure recency of drug use, participants were asked *When was the last time you used illicit drugs?*. Responses to this question were provided on a 6-point scale, ranging from *today* to *more than 6 months ago*.

Respondents were also asked to report the last drug that they had used from a list of substances: Heroin, Cannabis, Cocaine, Ecstasy, Ice, Speed, Ketamine, Benzos, Methadone/Bupe, Prescription opioids, Testosterone, Peptides or *other*. *Other* was left as

an open ended question for them to complete in case the drug last used was not on the list. In addition they were asked if they had used any of the above listed drugs in the last 12 months. Participants could tick as many of these drugs as they had used and once again *other* was left as an open ended question for them to complete. A variable was created to measure multiple drug use (the number of different types of drugs used by participants) by summing the different drugs the participants reported using in the last year.

Socio-demographic characteristics

Data were collected on relevant socio-demographic characteristics including: age at time of survey (years), age at time of first use (years), gender, years of education, and main source of income (see Table 1 above).

CHAPTER 4 - Results

Prior to conducting the main analyses, various sample characteristics were examined. These analyses were conducted on the 228 respondents who completed the Time 1 survey and the 78 respondents who completed the Time 2 survey. The majority of respondents used illicit drugs at least once a week or more often (see Table 2). Approximately half of the respondents at both time points reported using drugs every day, with over 40% reporting using on the day the survey was completed.

Table 2: Frequency and recency of drug use

Frequency of use in last 12 months	Time 1 %	Time 2 %
Not in the last 12 months	11.5	5.1
Once or twice a year	4.4	6.4
Every few months	5.8	7.7
About once a month	7.5	7.7
Once a week or more	25.7	21.8
Everyday	45.1	51.3
When was the last time you used drugs?	**Time 1 %**	**Time 2 %**
Today	41.5	47.4
Yesterday	26.1	26.3
Last week	16.9	9.2
More than a week ago	4.3	7.9
More than a month ago	5.3	2.6
More than 6 months ago	5.8	6.6

Participants reported cannabis as the primary drug of choice, followed by heroin and crystal methamphetamine (see Table 3). Three-quarters of the sample had used cannabis in the last 12 months, with over 60% having used crystal methamphetamine, and more than a third having used heroin. Twenty-two percent of respondents reported that they had used only one drug in the last 12 months, 23% reported they had used 2 or 3 different types of drugs, while 43% reported using four or more different illicit substances in the last 12 months.

Table 3: Drug of choice

Drug last used	Time 1 %	Time 2 %
Cannabis	36.7	42.1
Crystal methamphetamine	24.2	19.7
Heroin	22.2	27.6
Prescription opioids	4.8	2.6
Methadone	2.4	0
Cocaine	1.9	3.9
Used the following drug in the last 12 months (Categories are not mutually exclusive)		
Cannabis	74.9	76.3
Crystal methamphetamine	65.7	65.8
Heroin	43	34.2
Cocaine	28.5	26.3
Ecstasy	28	30.3
LSD	20.8	13.2
Speed	24.6	25
Ketamine	9.7	6.6
Benzodiazepines	27.5	28.9
Methadone	26.6	18.4
Prescription opioids	29.5	32.9
Other	12.1	17.1

Social network

Almost half of the participants reported that most or all of their friends used drugs at least once a month, and 29% reporting that most or all of their friends injected at least once a month (see Table 4). Approximately half the participants indicated that their friends would neither approve nor disapprove of them using regularly and/or occasionally.

Table 4: Social networks

How many of your friends use but do not inject drugs at least once a month	Time 1 %	Time 2 %
none	7.9	7.7
A few	29.4	32.1
About half	14.5	12.8
Most	33.3	32.1
All	14.9	15.4
How many of your friends inject drugs at least once a month		
none	22.4	10.3
A few	34.6	43.6
About half	14.5	16.7
Most	21.1	20.5
All	7.5	9
How do you think most of your friends would feel about you using regularly?		
Disapprove	34.2	32.1
Neither approve nor disapprove	48.7	53.8
Approve	17.1	14.1
How do you think most of your friends would feel about you using occasionally?		
Disapprove	27.6	25.6
Neither approve nor disapprove	54.8	55.1
Approve	17.5	19.2

Negative Consequences

Approximately two-thirds of the sample reported being the object of negative social sanctions in the form of a close call with police or being arrested because of drug use. Over 40% also reported having lost their job or being in trouble on the job or with school authorities (see Table 5).

Table 5: Negative consequences

Trouble around drug use	Time 1 %	Time 2 %
Had a close call with police /arrested because of drug use	64.8	69.7
Lost job or trouble on the job or with school authorities	43.2	47.4

Using on the day of testing

To investigate the reliability of the IAT with people who have recently used illicit substances, analysis was conducted to look at participants' reaction times on the IAT taking into account recency of use. Analyses found that variability in reaction time did not differ between those who used drugs on the day of testing and those who had not. The fact that no significant differences were found in reaction times (see Table 6), suggests that using drugs on the day of testing did not affect the reliability of the test [$F(1, 221) = .05$, $p>.05$].

Table 6: IAT Reaction time based on recency of use

	Mean	SD	N	*F*	*p*
Used drugs on the day of testing	428.623	262.595	85		
Did not use drug son the day of testing	421.037	246.150	138	.05	.828

Study drop out

Analyses were conducted to determine whether there were systematic differences between participants who only completed the study at Time 1 compared to those who completed the study across both time points. Time 1 measures of severity of dependence, implicit and explicit identification, function of drug use, frequency and recency of drug use, and multiple drug use were analysed to assess whether these differed between people who completed both testing sessions and those who did not. No significant differences were found on most of these variables (see Table 7), suggesting that these factors did not play a role in participant drop out. Participants who were using more frequently were, however, significantly more likely to be recruited again [$F(1, 224) = 11.83$, $p<.001$]. One possible reason for this finding is that participants who were using more frequently were more likely to be frequenting the same recruitment sites (parks, train stations and NSPs) where they were originally surveyed.

Table 7: Dropped out vs. retained participants

	T1 Mean	T1 SD	N	*F*	*p*
SDS *(dropped out)*	1.121	.758	131		
SDS *(retained)*	1.259	.777	76	1.57	.211
IAT *(dropped out)*	.022	.526	143		
IAT *(retained)*	-.043	.586	75	.69	.406
Explicit identification *(dropped out)*	3.821	1.287	148		
Explicit identification *(retained)*	3.953	1.379	76	.50	.479
Function of use *(dropped out)*	4.963	1.477	139		
Function of use *(retained)*	5.127	1.090	74	.71	.400
Frequency of use *(dropped out)*	4.392	1.817	148		
Frequency of use *(retained)*	5.192	1.320	78	11.83	.001
Recency of use *(dropped out)*	2.267	1.523	131		
Recency of use *(retained)*	2.171	1.341	76	.21	.648
Multiple drug use *(dropped out)*	.335	.240	131		
Multiple drug use *(retained)*	.309	.191	76	.66	.419

As can be seen in Table 8, there was little movement among participants from injecting to non-injecting or vice-versa as their main route of administration of illicit substances between Time 1 and Time 2. Seven participants changed from injecting at Time 1 to other methods of administration at Time 2 and three participants changed from smoking or snorting at Time 1 to injecting at Time 2.

Table 8: Movement from non-injecting to injecting as main route of administration

		Injecting as main route of administration at Time 2		
		No	Yes	Total
Injecting as main route of administration at Time 1	No	35	3	38
	Yes	7	33	40
	Total	42	36	78

To test the hypothesis that implicit associations between self and drug use would be stronger among participants who use harder drugs regularly than those participants who use softer drugs recreationally, injecting as main route of administration was analysed to see how it relates to the different drug-using variables. Point-biserial correlations revealed that implicit and explicit identification with drug use, frequency, multiple drug use, and severity of dependence all positively correlated with injecting at Time 1. There was also a negative correlation between recency of drug use and injecting (more recent use of drugs was given a lower score in the survey). Taken together this finding indicates that participants who were injecting were more likely to be habitual users of drugs (measured by frequency, recency, multiple use, and severity of use) and have greater implicit and explicit identification with their drug use at Time 1 (see Table 9). These findings suggest that these measures of identification are tracking drug use behaviour in the expected direction. However, this pattern was not found with the smaller sample at Time 2, with the exception of a significant positive correlation between multiple drug use and injecting at Time 2.

Table 9: Point-biserial correlation with injecting as main route of administration

	Injecting Time 1	Injecting Time 2
IAT	.229***	.180
Explicit	.403***	.163
Frequency	.303***	.156
Recency	-.248***	-.130
Multiple drug use	.308***	.306**
Severity of dependence	.336***	.204

To investigate the bivariate relationships among all of the variables, correlations were conducted to examine relationships at Time 1 (see Table 10) and Time 2 (see Table 11). For the purpose of this study, more serious drug use was seen to be a combination of three variables; frequency, recency, and multiple drug use. In order words, participants who used more frequently and recently and who reported using two or more drugs over a sustained period of time were seen as using drugs more seriously. As can be seen in these tables, seriousness of drug use was significantly correlated with several other

variables. Participants who used drugs more often were more likely to be injecting as a main route of administration and to show greater severity of dependence. This finding supports existing research that suggests that as dependence on drugs increases and as people transition to harder drugs and injecting, so too does the need to use drugs more regularly (Gossop et al., 1992).

People who used drugs more frequently were found to have significantly more friends who were using and injecting. This finding supports research discussed in chapter one that suggests that peer networks are particularly influential in the decision for most young people to use drugs and that drug use often takes place in social settings (Bryant et al.,2012; Fuller et al., 2003, 2005; Treloar et al., 2003). Further, previous literature has shown that using drugs to improve depressed moods and/or for social purposes is associated with frequency of drug use (Boys et al., 2001). Consistent with these findings, participants who used drugs more frequently were more likely to report using drugs for positive social interaction and mood enhancements. Using drugs at a younger age was also associated with using more frequently. This finding supports literature that suggests that age of first drug use is a powerful predictor of lifetime drug dependence (Loxley et al., 2004; Obot et al., 2001; Toumbourou & Catalano; 2005). Participants who used more seriously also reported encountering significantly more negative consequences (Kaplan & Johnson, 1991) and showed increased severity of dependence on their drug use (Gossop et al., 1992, 1995), both of which are consistent with prior research. In addition, significant correlations between explicit and implicit identification with the three variables that represent seriousness of drug use suggests that patterns of drug use are tied up with the identity of the individual and may be a significant predictor of movement from occasional to regular drug use.

Table 10: Correlations at Time 1

Time 1	Frequency	Recency	Multiple drug use	SDS	Explicit ID	Implicit ID	Function of use	Friends use	Friends inject	Perceived peer support	Education	Income	Age	Age first use	Negative social sanctions	Gender
Recency	-.536***															
Multiple drug use	.304***	-.319***														
SDS	.312***	-.283***	.310***													
Explicit ID	.506***	-.430***	.423***	.419***												
Implicit ID	.052	-.204**	.220**	.175*	.176**											
Function	.362***	-.284***	.267***	.348***	.569***	.098										
How many friends use but do not inject	.225***	-.099	.211**	.139*	.335***	.134*	.386***									
How many friends inject drugs	.360***	-.241***	.186**	.225***	.470***	.249***	.301***	.305***								
Perceived peer support	.122	.009	-.057	-.098	.295***	.085	.287***	.339***	.251***							
Education	-.077	-.002	.068	-.007	-.143*	-.090	.009	-.051	-.177**	-.219***						
Income	.083	-.033	.078	.024	.169*	-.028	.153*	-.148*	.161*	.159*	-.091					
Age	.167*	-.172*	.211**	.261***	.226***	.242***	.011	-.135*	.212***	-.106	-.013	-.006				
Age first use	-.374***	.095	-.036	-.110	.332***	-.081	-.135*	-.105	-.166*	-.119	.106	-.176**	-.160*			
Negative consequences	.144*	-.185**	.269***	.342***	.371***	.156*	.234***	.018	.349***	.012	-.081	.007	.165*	-.131		
Gender	-.115	-.018	-.118	.104	-.021	.073	-.048	.084	-.020	.042	.132	.074	-.126	.062	-.182**	
Injecting as main route[2]	.303***	-.248***	.308***	.336***	.403***	.229***	.200***	-.090	.396***	-.119	-.013	.096	.499***	-.193	.263***	.095

[1]Transgender and unisex were excluded from gender analyses. Point-biserial correlations used to examine relationships between other variables and gender
[2]Point-biserial correlations used to examine relationships between other variables and injecting
* Correlation is significant at the 0.05 level (2 tailed)
** Correlation is significant at the 0.01 level (2 tailed)
*** Correlation is significant at the 0.001 level (2 tailed)

Table 11: Correlations at Time 2

Time 2	Frequency	Recency	Multiple drug use	SDS	Explicit ID	Implicit ID	Function of use	Friends use	Friends inject	Perceived peer support	Education	Income	Age	Age first use	Negative social sanctions	Gender
Recency	-.553***															
Multiple drug use	.337**	-.290*														
SDS	.113	-.102	.175													
Explicit ID	.440***	.513***	.359***	.347**												
Implicit ID	.320**	.453***	.048	.200	.272*											
Function of use	.427***	.222	.136	.287*	.412***	.329**										
How many friends use but do not inject	.399***	-.189	.123	-.211	.133	.108	.179									
How many friends inject drugs	.386***	-.295**	.158	-.007	.421***	.249*	.140	.232*								
Perceived peer support	.289*	-.095	-.127	-.062	.174	.172	.194	.291**	.276*							
Education	.243*	.011	.234*	.138	-.015	-.079	.116	.004	-.055	-.007						
Income	.102	-.037	.100	.132	-.081	.099	.045	-.034	.019	.028	-.185					
Age	-.060	-.138	.029	.208	.222	.100	-.109	-.231*	.128	-.218	-.012	-.035				
Age first use	-.293**	.213	-.173	.193	-.252*	-.102	-.001	-.186	-.186	-.131	-.007	.008	.042			
Negative social sanction	.048	-.148	.26*	.343**	.445***	.099	.258*	-.178	.180	-.048	-.156	.032	.218	-.238*		
Gender[1]	-.175	.262*	-.145	-.055	-.149	-.216	-.039	-.263*	-.149	-.056	-.029	.010	.219	-.044	.095	
Injecting as main route	.156	-.130	.306**	.204	.163	.180	.047	-.177	.183	-.291**	.245*	-.102	.418***	-.049	.188	-.072

[1]Transgender and unisex were excluded from gender correlation. Point-biserial correlations used to examine relationships between other variables and gender.
[2]Point-biserial correlations used to examine relationships between other variables and injecting.
* Correlation is significant at the 0.05 level (2 tailed)
** Correlation is significant at the 0.01 level (2 tailed)
*** Correlation is significant at the 0.001 level (2 tailed)

The relationships that exist between frequency/recency of use/multiple drug use and implicit/explicit identification in Tables 10 and 11 suggests that these identity variables might play a role in whether drug use increases or decreases in seriousness over time. As a first step in testing this possibility, correlations between Time 1 and Time 2 variables were examined.

According to predictions, identification with drug use should predict greater frequency and recency of drug use over time (see Table 12). The results of Table 12 suggest that explicit identification is associated with greater frequency, recency and multiple drug use, and that frequency and recency of use at Time 1 is associated with greater explicit identification at Time 2. Finally, multiple drug use at Time 1 is associated with greater implicit and explicit identification at Time 2.

Table 12: Longitudinal correlations across Time 1 and Time 2 variables

	Frequency Time 1	Recency Time 1	Multiple drug use Time1	SDS time1	Function of use Time1	Explicit ID Time1	Implicit ID Time1
Frequency Time2	.587***	-.352**	.189	.063	.242*	.427***	.062
Recency Time2	-.241*	.435***	-.340***	-.127	-.252*	-.379***	-.128
Multiple drug use Time2	.231*	-.263*	.604***	.071	.212	.404***	.015
SDS Time2	.141	-.122	.250*	.454***	.361**	.286*	.199
Function Time2	.342**	-.153	.127	.184	.515***	.285*	.161
Explicit ID Time2	.326**	-.336**	.397***	.268*	.457***	.662***	.216
Implicit ID Time2	.050	-.129	.235*	.011	.258*	.170	.114

Longitudinal regression analyses

To test the hypothesis that participants who showed a strong implicit association between self and drug use would develop more serious drug use, regression analyses were conducted to predict frequency, recency and multiple drug use.

To test the possibility that a strong implicit association between self and drug use at Time 1 would lead to increased frequency of drug use at Time 2, frequency of use at Time 2

was regressed on frequency of use at Time 1 in the first step of the model. In the second step of the model implicit and explicit identification were added as predictors. Neither implicit nor explicit identification predicted frequency of use at Time 2 after controlling for frequency of use at Time 1, and so these paths are left out of the model. As expected, frequency of use at Time 1 predicted frequency of use at Time 2.

To test the hypothesis that frequency of drug use would lead to stronger implicit and explicit identification with drug use over time, implicit and explicit identification at Time 2 were regressed on implicit and explicit identification at Time 1 in step 1, and frequency of use was added as a predictor in the second step of the model. As can be seen in Figure 1, explicit identification at Time 1 predicted explicit identification at Time 2, but implicit identification at Time 1 did not predict implicit identification at Time 2. Furthermore, frequency of use did not account for independent variance in either implicit or explicit identification (and so these paths are left out of the model). Tables 13, 14, and 15 report the coefficients from these longitudinal analyses with frequency of use.

Figure 3: Frequency of drug use across time

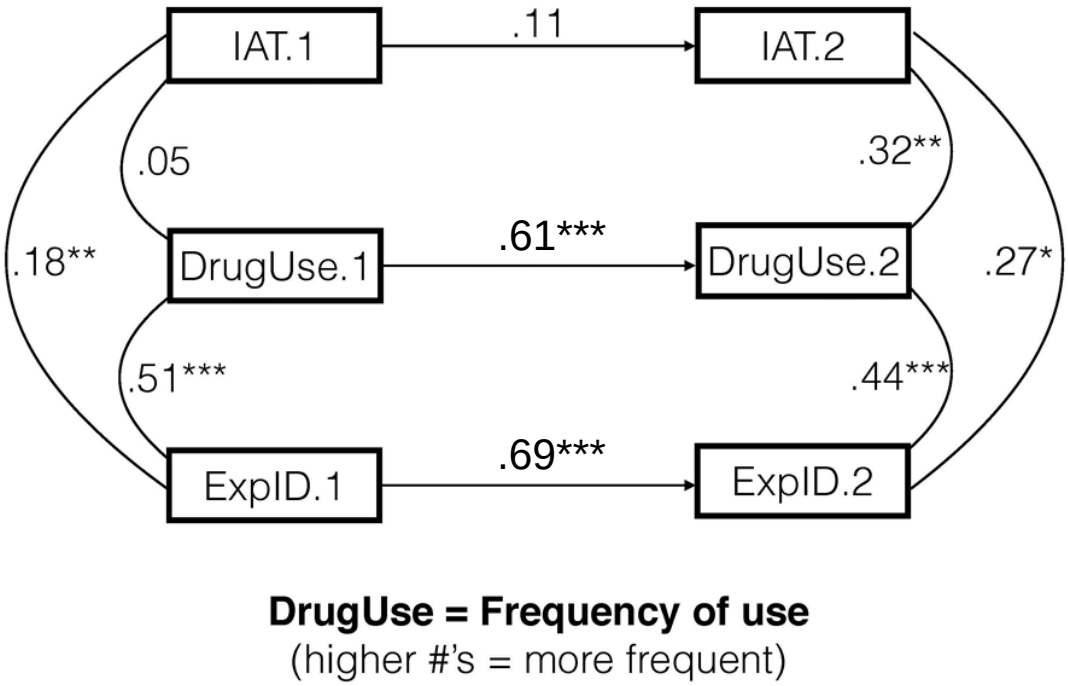


Table 13: Frequency of use at Time 2

	Beta	*t*	*p*
Frequency at Time 1	.606	5.695	.000
Explicit identification at Time 1	.084	.777	.449
IAT Time 1	.084	.896	.373

Table 14: Explicit identification at Time 2

	Beta	*t*	*p*
Explicit identification at Time 1	.686	6.850	.000
IAT Time 1	.091	1.048	.298
Frequency at Time 1	.020	.200	.842

Table 15: Implicit identification at Time 2

	Beta	*t*	*p*
IAT at Time 1	.110	.897	.373
Explicit identification Time 1	.168	1.174	.245
Frequency at Time 1	.009	.065	.948

Similarly, to test the possibility that a strong implicit association between self and drug use would lead to increased recency of drug use, in the first step of the model recency of use at Time 2 was regressed on recency of use at Time 1. In the second step of the model implicit and explicit identification were added as predictors. Neither explicit identification nor implicit identification predicted recency of use at Time 2 after controlling for recency at Time 1, so these paths are again left out of the model.

To test the hypothesis that recency of drug use would be associated with stronger implicit and explicit identification with drug use over time, further regression analyses were conducted. Implicit and explicit identification at Time 2 were regressed on implicit and explicit identification at Time 1 in step 1, and recency of use was added as a predictor in the second step of the model. As can be seen in Figure 2, recency of use did not account for independent variance in either implicit or explicit identification (and so these paths are left out the model). Tables 16, 17 and 18 report the coefficients from these longitudinal analyses with recency of use.

Figure 4: Recency of use across time

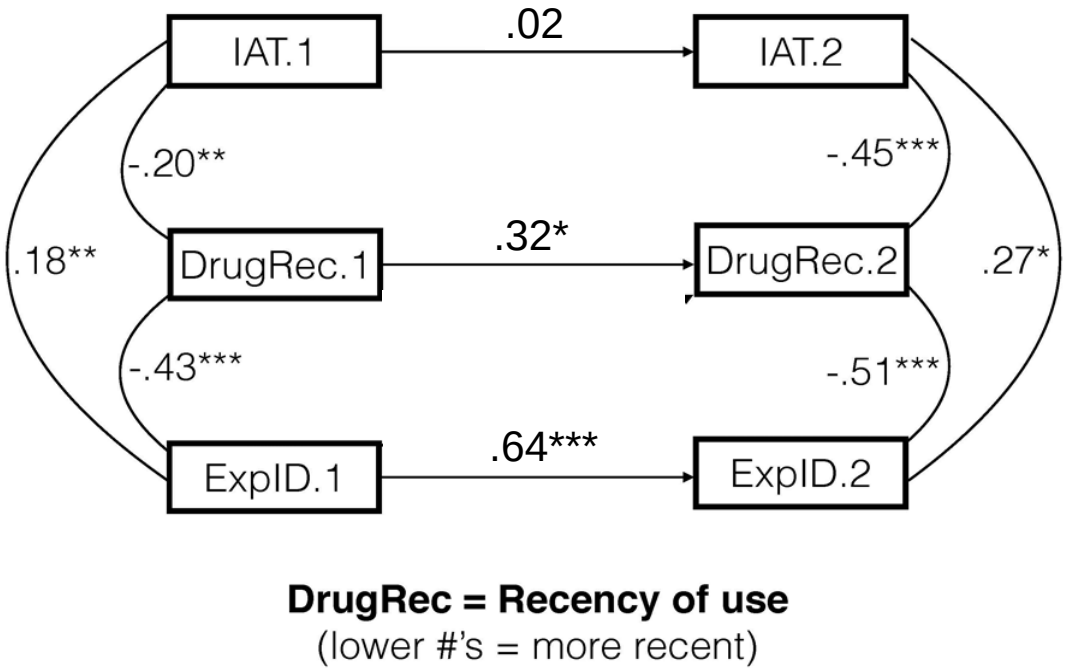


Table 16: Recency of use at Time 2

	Beta	*t*	*p*
Recency at Time 1	.324	2.490	.015
Explicit identification at Time 1	-.239	-1.874	.065
IAT Time 1	.019	.165	.870

Table 17: Explicit identification at Time 2

	Beta	*t*	*p*
Explicit identification at Time 1	.640	6.463	.000
IAT Time 1	.073	.809	.421
Recency at Time 1	-.102	-1.007	.318

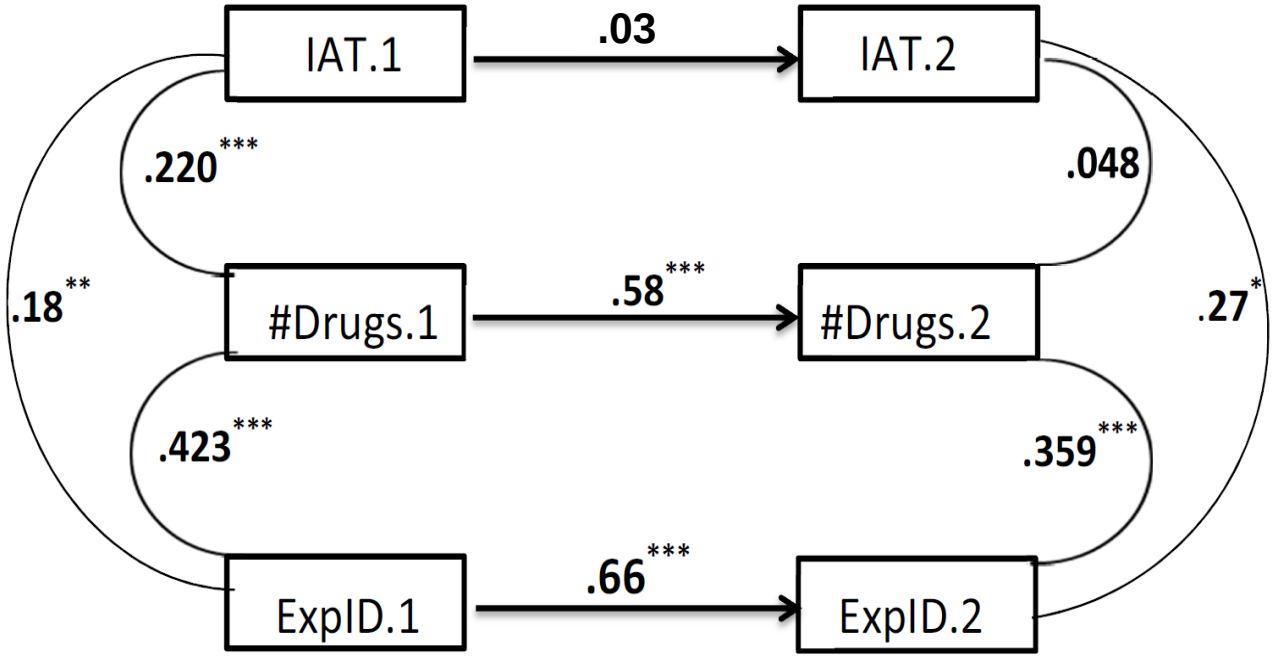
Table 18: Implicit identification at Time 2

	Beta	*t*	*p*
IAT at Time 1	.023	.180	.858
Explicit identification Time 1	.098	.679	.500
Recency at Time 1	-.166	-1.095	.278

To test the possibility that a strong implicit association between self and drug use would lead to an increase in multiple drug use, in the first step of the model multiple drug use at Time 2 was regressed on multiple drug use at Time 1. In the second step of the model implicit and explicit identification were added as predictors. Neither implicit nor explicit identification predicted multiple drug use at Time 2 after controlling for multiple drug use at Time 1, so these paths are left out of the model.

To test the hypothesis that multiple drug use would lead to stronger implicit and explicit identification with drug use over time, implicit and explicit identification at Time 2 were regressed on implicit and explicit identification at Time 1 in step 1, and multiple drug use was added as a predictor in the second step of the model. As can be seen in Figure 3, multiple drug use did not account for independent variance in either implicit or explicit identification (and so these paths are left out the model). Tables 18, 19 and 20 report the coefficients from these longitudinal analyses with report the coefficients from these longitudinal analyses with multiple drug use.

Figure 5: Multiple drug use across time



#Drugs = Number of different types of drug used
(higher #'s = more different types of drugs used)

Table 19: Multiple drug use at Time 2

	Beta	*t*	*p*
Multiple drug use at Time 1	.582	5.581	.000
IAT at Time 1	.189	1.825	.072
Explicit identification Time 1	-.119	-1.222	.226

Table 20: Explicit identification at Time 2

	Beta	*t*	*p*
Explicit identification at Time 1	.656	6.943	.000
IAT at Time 1	.078	.876	.384
Multiple drug use at time 1	.086	.898	.373

Table 21: Implicit identification at Time 2

	Beta	*t*	*p*
IAT at Time 1	.029	.234	.816
Explicit identification at Time 1	.106	.802	.426
Multiple drug use at Time 1	.199	1.486	.142

Subsidiary analyses

As can be seen in Tables 10 and 11, the IAT is correlated with recency of use and multiple drug use at Time 1 and frequency and recency of use at Time 2, but it is not clear whether the IAT predicts unique variance after controlling for explicit identification. To assess whether the IAT predicts unique cross-sectional variance in frequency of use, frequency was regressed simultaneously on the IAT and explicit identification, separately at Time 1 (see Table 22) and Time 2 (see Table 23). The Time 2 analyses also included the Time 1 indicator of frequency in the first step of the model.

Similarly, to assess whether the IAT predicts unique variance in recency of use, recency was regressed simultaneously on the IAT and explicit identification, separately at Time 1 (see Table 24) and Time 2 (see Table 25). The Time 2 analyses also included the Time 1 indicator of recency in the first step of the model. Lastly, to assess whether the IAT predicts unique variance in multiple drug use, multiple drug use was regressed simultaneously on the IAT and explicit identification, separately at Time 1 (see Table 26)

and Time 2 (see Table 27). The Time 2 analyses also included the Time 1 indicator of multiple drug use in the first step of the model.

As can be seen in Tables 22-27, these analyses revealed that the IAT predicted unique variance in recency and multiple drug use at Time 1. Explicit identification predicted unique variance in all three variables at Time 1. At Time 2, both explicit and implicit identification predicted independent variance in recency and frequency of use, although neither predicted independent variance in multiple drug use at Time 2.

Table 22: Frequency of use at Time 1

	Beta	*t*	*p*
IAT at Time 1	-.028	-.465	.643
Explicit identification at Time 1	.525	8.794	.000

Table 23: Frequency of use at Time 2

	Beta	*t*	*p*
Frequency at Time 1	*.526*	*5.961*	*.000*
IAT at Time 2	*.229*	*2.653*	*.010*
Explicit identification at Time 2	*.237*	*2.582*	*.012*

Table 24: Recency at Time 1

	Beta	*t*	*p*
IAT at Time 1	*-.156*	*-2.422*	*.016*
Explicit identification at Time 1	*-.423*	*-6.588*	*.000*

Table 25: Recency at Time 2

	Beta	*t*	*p*
Recency at Time 1	*.266*	*2.733*	*.008*
IAT at Time 2	*-.325*	*-3.432*	*.001*
Explicit identification at Time 2	*-.337*	*-3.337*	*.001*

Table 26: Multiple drug use at Time 1

	Beta	*t*	*p*
IAT at Time 1	*.172*	*2.664*	*.008*
Explicit identification at Time 1	*.423*	*6.229*	*.000*

Table 27: Multiple drug use at Time 2

	Beta	*t*	*p*
Multiple drug use at Time 1	*.552*	*5.263*	*.000*
IAT at Time 2	*-.119*	*-1.182*	*.241*
Explicit identification at Time 2	*.177*	*1.671*	*.099*

To assess whether these relationships between the identification variables and frequency and recency of use, and multiple drug use, might be accounted for by other variables, recency, frequency, and multiple drug use were each regressed simultaneously on the identification variables and each control variable separately at Time 1 and Time 2.

No relationship was found between *implicit* identification and frequency at Time 1.
At Time 2, to assess what might account for the relationship between *implicit* identification and frequency of use at Time 2, the Time 1 indicator of frequency was included in the first step of the model together with the previously used variables. The number of friends that use but do not inject at least once a month at Time 2 and function of use at Time 2 were found to have a significant effect on the frequency of drug use. These significant variables were then entered into the same equation, to see if *implicit* identification can predict unique variance in frequency of use beyond these significant alternatives, while still controlling for frequency at Time 1. The findings suggest that while these two other predictor variables have a significant effect on drug use frequency, they are not able to predict unique variance in drug use frequency over and above *implicit* identification (see Table 28).

Table 28: Frequency with implicit identification at Time 2

	Beta	*t*	*p*
Frequency at Time 1	.551	5.581	.000
SDS at Time 2	-.001	-.009	.993
IAT at Time 2	.271	2.715	.008
Frequency at Time 1	.439	4.278	.000
Function of use at Time 2	.242	2.227	.029
IAT at Time 2	.218	2.135	.036
Frequency at Time 1	.555	6.698	.000
Number of friends that use but do not inject at least once a month at Time 2	.263	3.158	.002
IAT at Time 2	.264	3.223	.002
Frequency at Time 1	.554	6.278	.000
Number of friends that inject at least once a month at Time 2	.178	1.954	.055
IAT at Time 2	.248	2.839	.006
Frequency at Time 1	.592	6.414	.000
Negative social sanctions at Time 1	-.043	-.459	.648
IAT at Time 2	.280	3.068	.003
Frequency at Time 1	.603	6.966	.000
Age at Time 2	-.070	-.808	.422
IAT at Time 2	.297	3.412	.001
Frequency Time 1	.583	6.209	.000
Age of first use at Time 2	-.051	-5.44	.588
IAT at Time 2	.286	3.278	.002

Frequency at Time 1	.606	7.080	.000
Gender at Time 2	-.135	-1.545	.127
IAT at Time 2	.261	2.973	.004
Frequency at Time 1	.571	6.534	.000
Education at Time 2	.148	1.697	.094
IAT at Time 2	.303	3.541	.001
Frequency at Time 1	4.33	4.408	.000
Number of friends that use but do not inject at least once a month at Time 2	.250	2.718	.008
Function of use at Time 2	.198	1.886	.064
IAT at Time 2	.209	2.145	.036

Similarly, with regard to recency of drug use at Time 1, the same variables that might account for the relationship between *implicit* identification and recency of use were entered into a regression analysis separately. Several of the control variables were again found to have an effect on recency of use. Severity of dependence of drug use, function of use, the number of friends that inject drugs and negative social sanctions were found to have a significant effect on recency of drug use. An additional regression analysis was conducted to see if implicit identification would still be significant when simultaneously controlling for the above variables that emerged as significant predictors in the model. Implicit identification was not found to be meaningfully related with recency at Time 1 over and above severity of dependence and function of use (see Table 29).

Table 29: Recency with implicit identification at Time 1

	Beta	*t*	*p*
SDS at Time 1	-.267	-3.895	.000
IAT at Time 1	-.157	-2.293	.023
Function of use at Time 1	-.264	-3.837	.000
IAT at Time 1	-.172	-2.501	.013

Number of friends that use but do not inject at least once a month at Time 1	-.086	-1.230	.220
IAT at Time 1	-.192	-2.740	.007
Number of friends that inject at least once a month at Time 1	-.208	-2.942	.004
IAT at Time 1	-.153	-2.162	.032
Negative social sanctions at Time 1	-.193	-2.781	.006
IAT at Time 1	-.175	-2.527	.012
Age at Time 1	-.108	-1.497	.136
IAT at Time 1	-.176	-2.438	.016
Age at first use at Time 1	.102	1.468	.144
IAT at Time 1	-.206	-2.960	.003
Gender at Time 1	-.021	-.292	.770
IAT at Time 1	-.203	-2.824	.005
Education at Time 1	-.001	-.015	.988
IAT at Time 1	-.204	-2.906	.004
SDS at Time 1	-.163	-2.161	.032
Function of use at Time 1	-.169	-2.301	.023
Number of friends that inject at least once a month at Time 1	-.107	-1.418	.158
Negative social sanctions at Time 1	-.060	-.794	.428
IAT at Time 1	-.118	-1.686	.093

To assess what might account for the relationship between *implicit* identification and recency of use at Time 2, the Time 1 indicator of recency was included in the first step of the model together with all the other variables at Time 2. Only gender was found to also have a significant effect on recency of drug use over time. However, when controlling for

gender, implicit identification was still found to be meaningfully related to recency of use at Time 2 (see Table 30).

Table 30: Recency with implicit identification at Time 2

	Beta	*t*	*p*
Recency at Time 1	.349	3.361	.001
SDS at Time 2	.021	.202	.840
IAT at Time 2	-.400	-3.802	.000
Recency at Time 1	.342	3.274	.002
Function of use at Time 2	-.066	-.597	.552
IAT at Time 2	-.379	-3.489	.001
Recency at Time 1	.387	4.014	.000
Number of friends that use but do not inject at least once a month at Time 2	-.181	-1.881	.064
IAT at Time 2	-.389	-4.020	.000
Recency at Time 1	.348	3.510	.001
Number of friends that inject at least once a month at Time 2	-.148	-1.452	.151
IAT at Time 2	-.375	-3.758	.000
Recency at Time 1	.399	3.691	.000
Negative social sanctions at Time 2	.051	.474	.637
IAT at Time 2	-.411	-4.169	.000
Recency at Time 1	.376	3.749	.000
Age Time 2	-.014	-.137	.891
IAT at Time 2	-.407	-4.096	.000
Recency at Time 1	.361	3.645	.001
Age of first use at Time 2	.107	1.081	.284
IAT at Time 2	-.399	-4.062	.000

Recency at Time 1	.413	4.299	.000
Gender at Time 2	.231	2.364	.021
IAT at Time 2	-.353	-3.615	.001
Recency at Time 1	.377	3.821	.000
Education at Time 2	-.033	-.340	.735
IAT at Time 2	-.412	-4.158	.000

Similarly, with regard to multiple drug use at Time 1, the same variables that might account for the relationship between *implicit* identification and multiple drug use were entered into a regression analysis separately. Several of the control variables were again found to have an effect on number of different drugs used. Severity of dependence of drug use, function of use, the number of friends that use drugs and the number of friends that inject drugs, negative social sanctions and the age of participant at the time of the survey were also found to have a significant effect on multiple drug use. When controlling for these variables that emerged as predictors of multiple drug use at Time1, only age at the time of the survey and the number of friends that use drugs were still found to have a significant effect on multiple drug use (see Table 31).

Table 31: Multiple drug use with implicit identification at Time 1

	Beta	*t*	*p*
SDS at Time 1	.276	4.057	.000
IAT at Time 1	.172	2.527	.012
Function of use at Time 1	.248	3.609	.000
IAT at Time 1	.198	2.875	.005
Number of friends that use but do not inject at least once a month at Time 1	.185	2.676	.008
IAT at Time 1	.196	2.842	.005
Number of friends that inject at least once a month at Time 1	.147	2.072	.040
IAT at Time 1	.184	2.587	.010

Negative social sanctions at Time 1	.233	3.401	.001
IAT at Time 1	.186	2.714	.007
Age at Time 1	.178	2.501	.013
IAT at Time 1	.174	2.447	.015
Age at first use at Time 1	-.040	-.569	.570
IAT at Time 1	.221	3.173	.002
Education at Time 1	.063	.908	.365
IAT at Time 1	.225	3.223	.001
SDS at Time 1	.135	1.753	.081
Function of use at Time 1	.124	1.644	.102
Number of friends that use but do not inject at least once a month at Time 1	.177	2.355	.020
Number of friends that inject at least once a month at Time 1	-.034	-.445	.657
Negative social sanctions at Time 1	.147	1.966	.051
Age at Time 1	.159	2.142	.033
IAT at Time 1	.113	1.607	.110

Once again, to assess what might account for the relationship between *implicit* identification and multiple drug use at Time 2, the Time 1 indicator of multiple drug use was included in the first step of the model together with all the other variables at Time 2. No variables were found to have a significant effect on multiple drug use over time (see Table 32).

Table 32: Multiple drug use with implicit identification at Time 2

	Beta	*t*	*p*
Multiple drug use at Time 1	.588	5.693	.000
SDS at Time 2	.056	.546	.587
IAT at Time 2	-.103	-1.016	.313

Multiple drug use at Time 1	.585	5.698	.000
Function of use at Time 2	.081	.766	.447
IAT at Time 2	-.112	-1.047	.299
Multiple drug use at Time 1	.617	6.249	.000
Number of friends that use but do not inject at least once a month at Time 2	.131	1.358	.179
IAT at Time 2	-.097	-.975	.333
Multiple drug use at Time 1	.612	6.219	.000
Number of friends that inject at least once a month at Time 2	.149	1.510	.136
IAT at Time 2	-.119	-1.177	.243
Multiple drug use at Time 1	.600	5.489	.000
Negative social sanctions at Time 2	.032	.297	.767
IAT at Time 2	-.083	-.826	.412
Multiple drug use at Time 1	.617	6.151	.000
Age Time 2	-.036	-.366	.715
IAT at Time 2	-.078	-.777	.440
Multiple drug use at Time 1	.559	5.914	.000
Age of first use at Time 2	-.074	-.744	.459
IAT at Time 2	-.087	-.873	.386
Multiple drug use at Time 1	.594	6.025	.000
Education at Time 2	.163	1.690	.096
IAT at Time 2	-.062	-.623	.535

These analyses were repeated to assess whether the relationships between *explicit* identification variables and frequency, recency of use and multiple drug use might also be accounted for by other variables.

At Time 1, the same nine variables that might account for the relationship between *explicit* identification and frequency of use were entered into separate regression analyses. Severity of dependence, function of use, number of friends that inject and age of first use were again found to have a significant effect on frequency of drug use at Time 1. These variables that emerged as predictors of frequency at Time1, were entered into an additional regression analysis. Explicit identification was still found to be meaningfully related to frequency at Time 1 even when simultaneously controlling for these other predictor variables (see Table 33). At Time 2, the Time 1 indicator of frequency of use was again included in the first step of the model separately. Function of use, number of friends that use but do not inject and negative social sanctions were found to have a significant effect on frequency of use. The findings however suggest that while several of these predictor variables once again have a significant effect on frequency of drug use, none of them predicted unique variance in drug use frequency over and above *explicit* identification (see Table 34).

Table 33: Frequency with explicit identification at Time 1

	Beta	*t*	*p*
SDS at Time 1	.183	2.600	.010
Explicit identification at Time 1	.321	4.561	.000
Function of use at Time 1	.188	2.499	.013
Explicit identification at Time 1	.309	4.112	.000
Number of friends that use but do not inject at least once a month at Time 1	.067	1.093	.275
Explicit identification at Time 1	.484	7.895	.000
Number of friends that inject at least once a month at Time 1	.162	2.502	.013
Explicit identification at Time 1	.432	6.675	.000
Negative social sanctions at Time 1	-.022	-.331	.741
Explicit identification at Time 1	.456	6.799	.000

Age Time 1	.057	.950	.343
Explicit identification at Time 1	.494	8.284	.000
Age of first use at Time 1	-.240	-4.063	.000
Explicit identification at Time 1	.432	7.306	.000
Gender at Time 1	-.090	-1.535	.126
Explicit identification at Time 1	.511	8.686	.000
Education at Time 1	.008	.132	.895
Explicit identification at Time 1	.507	8.606	.000
SDS at Time 1	.147	2.042	.043
Function of use at Time 1	.177	2.289	.023
Number of friends that inject at least once a month at Time 1	.110	1.553	.122
Age of first use at Time 1	-.013	-.196	.845
Explicit identification at Time 1	.175	2.083	.039

Table 34: Frequency with explicit identification at Time 2

	Beta	*t*	*p*
Frequency at Time 1	.417	4.210	.000
SDS at Time 2	-.070	-.686	.495
Explicit identification at Time 2	.360	3.438	.001
Frequency at Time 1	.357	3.465	.001
Function of use at Time 2	.221	2.011	.048
Explicit identification at Time 2	.204	1.924	.058
Frequency at Time 1	.456	5.160	.000
Number of friends that use but do not inject at least once a month at Time 2	.288	3.418	.001
Explicit identification at Time 2	.253	2.883	.005

Frequency at Time 1	.473	5.078	.000
How many friends inject at least once a month at Time 2	.173	1.785	.078
Explicit identification at Time 2	.213	2.146	.035
Frequency at Time 1	.471	5.135	.000
Negative social sanctions at Time 2	-.225	-2.314	.024
Explicit identification at Time 2	.426	4.233	.000
Frequency at Time 1	.488	5.246	.000
Age at Time 2	-.135	-1.495	.139
Explicit identification at Time 2	.311	3.260	.002
Frequency at Time 1	.484	4.858	.000
Age of first use at Time 2	-.037	-.384	.702
Explicit identification at Time 2	.273	2.867	.005
Frequency at Time 1	.506	5.458	.000
Gender at Time 2	-.142	-1.603	.113
Explicit identification at Time 2	.254	2.706	.008
Frequency at Time 1	.461	4.870	.000
Education at Time 2	.153	1.709	.092
Explicit identification at Time 2	.292	3.148	.002
Frequency at Time 1	.314	3.053	.003
Function of use at Time 2	.155	1.488	.141
Number of friends that use but do not inject at least once a month at Time 2	.282	2.920	.005
Negative social sanctions at Time 2	-.168	-1.588	.117
Explicit identification at Time 2	.313	2.837	.006

Similarly, the same nine variables that might account for the relationship between *explicit* identification and recency of use were entered into a regression analysis separately at Time 1. Only explicit identification was found to have a significant effect on the recency of drug use at Time 1 (see Table 35). At Time 2, the Time 1 indicator of recency of use was included in the first step of the model separately. Gender was also found to have a significant effect on recency of use at Time 2. The findings suggest that no other variable predicted unique variance in recency of use over and above *explicit* identification (see Table 36).

Table 35: Recency with explicit identification at Time 1

	Beta	*t*	*p*
SDS at Time 1	-.128	-1.843	.067
Explicit identification at Time 1	-.37	-5.401	.000
Function of use at Time 1	-.083	-1.076	.283
Explicit identification at Time 1	-.371	-4.839	.000
Number of friends that use but do not inject at least once a month at Time 1	.018	.276	.783
Explicit identification at Time 1	-.435	-6.563	.000
Number of friends that inject at least once a month at Time 1	-.083	-1.197	.233
Explicit identification at Time 1	-.396	-5.695	.000
Negative social sanctions at Time 1	-.046	-.675	.501
Explicit identification at Time 1	-.414	-6.084	.000
Age at Time 1	-.097	-1.509	.133
Explicit identification at Time 1	-.413	-6.390	.000
Age of first use at Time	.029	.455	.650
Explicit identification at Time 1	-.426	-6.597	.000

Gender at Time 1	-.026	-.394	.694
Explicit identification at Time 1	-.445	-6.870	.000
Education at Time 1	-.066	-1.021	.309
Explicit identification at Time 1	-.439	-6.835	.000

Table 36: Recency with explicit identification at Time 2

	Beta	*t*	*p*
Recency at Time 1	.246	2.326	.023
SDS at Time 2	.082	-.596	.555
Explicit identification at Time 2	-.442	-3.951	.000
Recency at Time 1	.258	2.424	.018
Function of use at Time 2	-.013	-.114	.910
Explicit identification at Time 2	-.392	-3.333	.001
Recency at Time 1	.313	3.096	.003
Number of friends that use but do not inject at least once a month at Time 2	-.164	-1.713	.091
Explicit identification at Time 2	-.386	-3.798	.000
Recency at Time 1	.290	2.838	.006
Number of friends that inject at least once a month at Time 2	-.086	-.812	.419
Explicit identification at Time 2	-.378	-3.418	.001
Recency at Time 1	.353	3.370	.001
Negative social sanctions at Time 2	.209	1.897	.062
Explicit identification at Time 2	-.485	-4.522	.000
Recency at Time 1	.294	2.845	.006
Age at Time 2	-.007	-.070	.945
Explicit identification at Time 2	-.411	-3.955	.000

Recency at Time 1	.286	2.788	.007
Age of first use at Time 2	.077	.777	.440
Explicit identification at Time 2	-.398	-3.832	.000
Recency at Time 1	.342	3.428	.001
Gender at Time 2	.247	2.609	.011
Explicit identification at Time 2	-.358	-3.576	.001
Recency at Time 1	.295	2.870	.005
Education at Time 2	.009	.093	.926
Explicit identification at Time 2	-.412	-4.014	.000

Once again, the same nine variables that might account for the relationship between *explicit* identification and multiple drug use were entered into a regression analysis separately at Time 1. Severity of dependence, negative social sanctions and age of participant at the time the survey were found to have a significant effect on multiple drug use. The findings however suggest that while several of these predictor variables once again have a significant effect on multiple drug use at Time 1, none of them predicted unique variance in drug use over and above *explicit identification* (see Table 37). At Time 2, the Time 1 indicator of multiple drug use was included in the first step of the model separately. No variables were found to have a significant effect on multiple drug use at Time 2 (see Table 38).

Table 37: Multiple drug use with explicit identification at Time 1

	Beta	*t*	*p*
SDS at Time 1	.161	2.312	.022
Explicit identification at Time 1	.355	5.104	.000
Function of use at Time 1	.061	.800	.425
Explicit identification at Time 1	.385	5.008	.000
Number of friends that use but do not inject at least once a month at Time 1	.104	1.578	.116
Explicit identification at Time 1	.394	5.959	.000

Number of friends that inject at least once a month at Time 1	.018	.259	.796
Explicit identification at Time 1	.416	5.927	.000
Negative social sanctions at Time 1	.138	2.042	.042
Explicit identification at Time 1	.374	5.529	.000
Age at Time 1	.149	2.313	.022
Explicit identification at Time 1	.396	6.153	.000
Age of first use at Time	.029	.451	.652
Explicit identification at Time 1	.427	6.596	.000
Education at Time 1	.122	1.904	.058
Explicit identification at Time 1	.439	6.854	.000
SDS at Time 1	.111	1.543	.124
Negative social sanctions at Time 1	.099	1.441	.151
Age at Time 1	.116	1.767	.079
Explicit identification at Time 1	.320	4.491	.000

Table 38: Multiple drug use with explicit identification at Time 2

	Beta	*t*	*p*
Multiple drug use at Time 1	.535	5.122	.000
SDS at Time 2	.004	.038	.970
Explicit identification at Time 2	.133	1.232	.222
Multiple drug use at Time 1	.534	5.156	.000
Function of use at Time 2	.002	.020	.984
Explicit identification at Time 2	.136	1.192	.237

Multiple drug use at Time 1	.551	5.446	.000
Number of friends that use but do not inject at least once a month at Time 2	.089	.949	.346
Explicit identification at Time 2	.132	1.295	.199
Multiple drug use at Time 1	.552	5.415	.000
Number of friends that inject at least once a month at Time 2	.057	.549	.585
Explicit identification at Time 2	.118	1.057	.294
Multiple drug use at Time 1	.549	5.164	.000
Negative social sanctions at Time 2	-.008	-.073	.942
Explicit identification at Time 2	.147	1.360	.178
Multiple drug use at Time 1	.549	5.420	.000
Age at Time 2	-.077	-.811	.420
Explicit identification at Time 2	.159	1.545	.127
Multiple drug use at Time 1	.541	5.290	.000
Age of first use at Time 2	-.041	-.426	.671
Explicit identification at Time 2	.137	1.333	.187
Multiple drug use at Time 1	.525	5.266	.000
Education at Time 2	.180	1.969	.053
Explicit identification at Time 2	.155	1.560	.123

CHAPTER 5 - Discussion and conclusion

This research aimed to develop a better understanding of the different drug use trajectories for young people who use or are *at risk* of using illicit drugs. Given that current research is unable to predict future trajectories or ongoing patterns of drug use, this study examined whether an individual's implicit and/or explicit identification with drug use plays a role in the type and severity of their future drug use. It also assessed whether patterns of drug use such as the frequency, recency and use of multiple drugs, may impact the way a person implicitly identifies with their drug use or the extent to which a person sees drug use as part of their self-identity. This study is the first research that assesses implicit identification with drug use as a possible predictor of movement from occasional use to regular use of hard drugs. The main findings of the research are discussed below. Although many of the hypotheses were not supported, the research nonetheless provides insight into the relationship between implicit and explicit identification and drug use.

Participants' characteristics

While numerous studies have been conducted with people who inject drugs, there are few studies that have been done on young *at risk* samples prior to or in the process of starting drug use. The relationship between participants' characteristics and illicit drug use found within this sample seem to back data from the few existing Australian studies on young *at risk* people and provide a further description of an understudied group who are *at risk* of transitioning to injecting drug use (Lea et al., 2015). Data from this sample supports existing evidence that young people who use illicit substances are more likely to drop out of high school, experience negative social sanctions, are unemployed, are more likely to come into contact with others who use and/or inject and are part of a drug-using social network. Almost two thirds of the sample reported being unemployed, having left school by year 10, and having a close call with police or being arrested. Peer networks have been identified in the literature as being particularly influential in determining drug use pathways (Creemers et al., 2010; Hawkins et al., 1992; Simons-Morton & Chen, 2006). More than 92% of this sample reported having friends who use drugs and over 80% reported having friends who inject drugs at least once a month. This research provides further evidence that within the social context in which these people live, the chances that they will engage in some form of drug use are high. Once again, given that known predictors of drug use are prevalent for this group, why some will transition into more hazardous drug-using lifestyles and others will not, remains an interesting question.

Implicit identification and seriousness of drug use

This research assessed participants' implicit and explicit identification with their drug use to determine whether identification relates to their drug use pathway. Based on previous research it was hypothesised that implicit associations between self and drug use would be stronger among people who use hard drugs regularly. Data at Time 1 indicate that, as predicted, implicit associations between self and drug use were stronger among participants who were injecting than people who were not, suggesting that those people who use harder drugs have a stronger identification with their drug use. However this pattern was not repeated at Time 2 with the smaller size sample. Further analysis also did not show an increase in the frequency and recency of drug use among participants who showed a stronger implicit association between self and drug use over time. Despite the finding that these variables were all significantly correlated with each other across time, neither implicit nor explicit identification was able to predict changes in frequency or recency of drug use across time.

It was also hypothesised that an increase in the frequency and recency of drug use would be associated with stronger implicit associations between self and drug use over time. Analysis of the data, however, did not support this prediction, with frequency and recency of use unable to account for independent variance in either implicit or explicit identification with drug use. Lastly, the study hypothesised that participants who showed a strong implicit association between self and drug use would increase their use of multiple drugs over time. Again analyses were unable to support this hypothesis and did not show that stronger implicit identification between self and drug use led to an increase in the number of different types of drugs used over time. Seriousness of drug use was then operationalised as a combination of frequency of drug use, recency of drug use, and multiple drug use. Once seriousness of drug use was controlled for at time 1, neither implicit identification nor explicit identification with drugs was able to significantly predict seriousness of drug use at time 2.

Self-identification in drug-using behaviour versus identification in recovery

Evidence suggests that drug use can become bound up with identity and that underpinning long term recovery from addiction is the reconstruction of a non-addict identity. Identification appears to play an important role in recovery from drug use with literature highlighting the importance of separating the self-concept from drug use for successful recovery from drug dependence (McIntosh & McKeganey, 2000; Siobain, 2015; Waldorf & Biernacki, 1981). Research on recovery shows that whilst many people who use hard

drugs are able to stop using temporarily, they often revert back to drug use, with multiple transitions in and out of serious drug use being common for many drug users (Beynon, Bellis & McVeigh, 2006; Galai, Safaeian, Vlahov, Bolotin & Celentano, 2003; Hser, Hoffman, Grella & Anglin 2001). Wolff et al. (2015) looked at the role implicit associations played in recovery and found implicit identification with drugs and alcohol to be the best predictor of length of time that people remained in the rehabilitation centres. This finding is particularly important because research indicates that the longer a person spends in treatment, the better their chances of long term recovery from substance use (Evans, Li & Hser, 2009; Satre, Mertens, Areán & Weisner, 2004; Flynn, Joe, Broome, Simpson & Brown, 2003). Therefore based on previous research, Wolff et al.'s findings would suggest that implicit identification with drugs during recovery might be a significant predictor of treatment outcome.

Why was implicit identification with drug use able to predict length of time in treatment centres in Wolff et al. (2015) but not intensity and frequency of drug use in a non-treatment setting in this research? It is possible that differences in the samples in the two studies may account for differences in the predictive role of implicit identification. In Wolff et al. (2015) the sample was older (mean age 34.8 years) and the participants were undergoing rehabilitation for alcohol and/or drug addiction. In the current sample the mean age was approximately 22 years and participants were either using or *at risk* of using illicit drugs and perhaps had not yet developed more entrenched patterns of drug use. Therefore the two samples are likely to differ in terms of their dependence on their drug of choice. In Wolff et al. (2015) all participants reported substance dependence prior to entering rehabilitation with participants having previously been treated for dependence an average of 4.43 times (SD = 5.87).

Another possible reason for this research not being able to extend the findings of Wolff et al. (2015) is that self-identification with drugs may play a different role in transitioning to drug use as it does in recovery from addiction. As discussed earlier, an important part of the recovery process is the reconstruction of a non-addict identity (Gibson et al., 2004; Hughes, 2007; McIntosh & McKeganey, 2000). This involves detangling the drug-using identity from the non-user. The reconstruction of a new non-user identity requires breaking down previous destructive patterns of behaviour, and involves lifestyle changes that may require moving to a new location or changing social networks to support the new identity (Gibson et al., 2004; Hughes, 2007; McKeganey, 2001). Hence not only does it involve a narrative of recovery, but new social interests and new routines need to be developed. It

may only be in the rehabilitation phase that people who are dependent on drugs come to first identify themselves as an *addict* before they begin to reconstruct a non-addict identity. For example, the 12-Step approach -- a structured approach traditionally used by Alcoholics Anonymous to facilitate recovery from alcohol abuse -- has increasingly been used in drug treatment programs (Fiorentine & Hillhouse, 2000; Morgenstern, Kahler, Frey & Labouvie, 1996, Wallace, 1996). Cognitive restructuring is an important part of the 12-Step approach in which the addict needs to first identify as an *addict* before they can start the recovery process (Steigerwald & Stone, 1999). According to these recovery programs, it is only after one has accepted this definition of being a dependent user that the person is able to relinquish routines, habits and any previously held understanding of themselves as linked to substance use. Only then can they be replaced with new behaviours and an acceptance of a new non-user identity (Kellogg, 1993; Stall & Biernacki, 1986; Steigerwald & Stone, 1999).

Therefore, for those people who are recovering from substance use, self-identification with alcohol/drugs is an important first step in their recovery. It is possible that this self-identification as an *addict* then reinforces drug use as part of their self-concept. Only once they can define themselves as an *addict* can they move towards change and establish a new non-user identity. Becoming a member of a non-drug-using social network is seen as crucial to the recovery process and involves establishing social networks that support the new identity (Mawson, Best, Beckwith, Dingle & Lubman, 2015). It is most likely in this phase that their implicit identification of themselves as dependent users starts to change to non-identification with substance use. It follows that perhaps those individuals who still continue to implicitly identify with their drug use while in treatment are those less likely to successfully complete their treatment. An alternate explanation is that the recovery programs require people to acknowledge explicitly their identification with drugs. This process of creating a greater explicit identification perhaps facilitates changes in implicit identification as well. It is possible that when they start to change their explicit identification, the way they see themselves moves from their unconscious to their conscious mind. It is only then that they can directly confront their drug-using identity in an effort to change it to a non-using identity.

Another possible explanation for changes in implicit identification with drugs is to look at the interplay of automatic and controlled processes. The associative-propositional evaluation (APE) model (Gawronski & Bodenhausen, 2007) specifies that implicit and explicit evaluations are the product of two separate mental processes. These responses

can be different but this does not imply that people hold two different attitudes toward the same object (Wilson et al., 2000). Implicit evaluations are assumed to be the outcome of associative processes and explicit evaluations are assumed to be the outcome of propositional processes. These two processes influence one another and the specific interplay of the two processes (in this case the implicit and explicit identification with drug use) can lead to corresponding and sometimes to non-corresponding evaluations for the two types of responses. The influence of the automatic and controlled processes over each other can possibly explain how explicit acknowledgment of a user identity during treatment might be a step in changing one's implicit identification.

In comparison, for those people who are transitioning into drug use, the more entrenched they become in patterns of drug use and in drug-using social networks, the more they may identify with the drug-using group and internalise the values and the norms of this group which are likely to be based around drug use (Biernacki, 1986, Mawson et al., 2015). Data from this research also found the number of friends that use drugs to be significantly related to drug use frequency over time. This suggests that entrenchment in drug-using social network and patterns of drug-using behaviour are closely linked. Implicit identification may develop gradually, with the more entrenched people become in drug-using networks and routines, the more they begin to implicitly identify with their drug use. It is possible therefore that implicit identification takes longer to form among those new to drug use in this research compared to the sample of dependent users in Wolff et al.'s study who had already commenced rehabilitation. Perhaps it is the case that a person needs to be more entrenched in a drug-using network before implicit and/or explicit identification with drug use has an effect on drug use behaviour. This may explain why implicit identification with drug use was not found to predict future aspects of participants' drug use, but rather was seen to be tracking drug use.

Tracking drug-using behaviour

Despite the lack of support for the research hypotheses, the results show that implicit identification reflects participants' levels of drug use. Even though implicit and explicit identification with drug use was not found to predict aspects of future drug use, the results suggest that it may be a marker of drug-using behaviour as identification was shown to mirror ongoing behaviour. In other words, the more a person uses drugs, the more they see themselves as a drug user both implicitly and explicitly.

As discussed in chapter one, there are several risk factors that are known to predict transition to serious drug use, yet little is known about the etiology of the different

pathways that young *at risk* individuals will follow. A young person's sense of self-worth can be fragile and being exposed to the known risk factors associated with transitioning to drug use such as homelessness, dysfunctional family life, dropping out of high school, may all contribute to a negative self-concept (Coates & McKenzie-Mohr, 2010; Fergusson & Lynskey, 1996; Kandel, 1982). These young people may easily become entrenched in street life and a drug-using culture that provides them with both social support and acceptance. Acceptance by drug-using peer networks may then increase entrenchment into a drug-using lifestyle fostering an environment that reinforces drug-using behaviour as well as exposure to injecting (Haller et al., 2010). It is well established that peer networks exert a profound influence on the transitioning to harder drug use (Creemers et al., 2010; Hawkins et al., 1992; Simons-Morton & Chen, 2006), but the exact role it plays needs to be further investigated. Future research should measure variables that relate to entrenchment in a drug-using lifestyle as possible determinants of drug use trajectories.

In addition to the influence of peer networks, another potentially important variable in understanding drug use trajectories is habits and whether those people who identify more strongly with their drug of choice are driven by their drug using habits. Habits, behavioural routines and social networks are all intertwined and could certainly have an influence on a person's sense of self and identity (Gibson et al., 2004; Hughes, 2007; McIntosh & McKeganey, 2000). It would be interesting to include drug using habits as a variable in future research to examine whether identification with drug use predicts pathways of use over and above drug habits.

Reliability of IAT on drug-using samples

The IAT was designed to measure automatic associations between concepts and attributes. The validity and reliability of the IAT has been well documented (Egloff & Shmukle, 2002; Greenwald & Farnham, 2000; Greenwald & Nosek; 2001; Greenwald, 2010). Yet data from this research shows just under half of the participants had recently used substances prior to completing the IAT. It is possible that this drug use may have influenced their ability to complete the IAT task appropriately. This point is illustrated in a study by Aberson and Beeney (2007), where lower reliabilities were found on the IAT scores for participants who recently used marijuana. The current research was able to add to this debate around the reliability of the IAT with people who have recently used illicit substances by examining the standard deviations on the IAT scores as a function of whether the participants had used drugs on that day or not. This analysis indicates that variability in reaction time did not differ between those who used drugs on the day of

testing and those who had not (refer to Table 6 in Results). This finding suggests that the IAT may be a reliable measure to assess implicit associations among people that may be using drugs at the time that they complete the IAT.

Limitations and future directions

Research has shown that implicit identification has been found to predict unique variance in drinking outcomes (Gray, LaPlante, Bannon, Ambady & Shaffer, 2011; Lindgren et al., 2013) as well as length of time spent in rehabilitation centres for alcohol and drug dependence (Wolff et al., 2015). The current study did not support the idea that implicit identification with drug use can predict future drug related behaviour. Aside from the conceptual reasons cited above there are some practical reasons why this lack of support may be the case. Because of the transient nature of this sample, recontacting participants proved extremely difficult and as a result the Time 2 sample was underpowered. Only 78 participants were recontacted at Time 2 over a 20 month period compared to the original sample of 228 at Time 1. Contact details for the majority of participants had changed between the two time points. Their phones had been disconnected, locations they had previously frequented had changed, with many peers not knowing where their friends had moved to. Additionally, several of the participants had been arrested in the interim and were in custodial settings and therefore not able to be recontacted. The small sample size at Time 2 is likely to have limited the ability to find a statistically significant association between implicit identification and patterns of future drug use.

Further, this study is not perfectly controlled as would be the case in a laboratory study. For example, while the average time lag between completion of the measures at Time 1 and Time 2 was 5.5 months, recontacting of participants actually ranged from 61 to 594 days between the initial and follow up survey session. It is possible that a longer time period between the two survey sessions is required in order to see actual changes in implicit associations and drug-using behaviour. In addition, the difficulties experienced in longitudinal recruitment may result in this sample not being as representative of an *at risk* youth population as one would hope. Perhaps those that are most *at risk* of serious drug use could not be traced for the follow up survey. It is likely the participants who have the most *chaotic* lifestyles and/or are possibly in custodial settings are hardest to recontact. Ideally future longitudinal research should be designed in such a way as to capture the more vulnerable and marginalised members of this *at risk* population to overcome the above short comings in order to better understand drug use trajectories.

Another limitation of this research concerns the accuracy of self-reported data. Even though there is previous literature that suggests that drug users are honest in their reporting of their drug related practices (Darke, 1998; Grella, Anglin, & Wugalter, 1997; Zanis, McLellan, & Randall, 1994), the stigma that surrounds drug use may influence participant responses. Social stigma and discrimination encountered by people who inject drugs together with the illegal nature of drug use, may impact the willingness of participants to openly discuss and be honest about their drug-using behaviours. In order to maximise reliable reporting, this research was designed as a self-administered survey to overcome under-reporting that is more common in an interviewer-administered survey (Harrison, 1997). However, it would be preferable for future research to use objective measures of the different aspects of drug use behaviour, such as urinalysis and hair analysis. In addition, it would be ideal if more than one implicit measure was included in the survey in order to ensure reliability and validity of the implicit data.

Finally, as discussed earlier, when comparing results from this research with findings from research on people in drug treatment facilities, possible questions regarding the role of implicit identification were raised. Previous research suggests implicit identification with drugs and alcohol to be the best predictor of length of time that people remained in rehabilitation centres (Wolff et al., 2015). As length of time in rehabilitation is related to long term treatment success (Evans et al., 2009; Satre et al., 2004; Flynn et al., 2003), the importance of implicit identification is highlighted. It is possible that those individuals who still continue to implicitly identify with their drug use while in treatment are those who are more likely to relapse after rehabilitation. Further investigation into implicit identification and relapse rates could yield interesting results regarding the role of implicit identification with relapse to drug use after recovery.

Concluding comments

Young people who may use drugs occasionally but are thought to be *at risk* of transitioning to regular use of hard drugs have become an area of considerable concern at both state and federal government levels and have been declared a *priority population* in the Australian Fourth National Hepatitis C Strategy (Australian Government Department of Health and Ageing, 2014). Not only is drug use more common amongst young people, but they are less likely than older drug users to access harm reduction and other healthcare facilities where they can obtain medical and social services (Bailey et al., 2003; Walker & Reibel, 2013; Wilson et al., 2003). Young people are also less likely to practice safe injecting behaviour and more likely to share needles and other injecting equipment (Buxton

et al., 2004; Day et al., 2005, Kerr et al., 2009). This high risk behaviour makes young injecting drug users especially vulnerable to seroconverting to HCV (Hahn et al., 2002). Reducing the potential for drug related harms requires a better understanding of the different drug use trajectories to limit movement from occasional drug use to regular use of harder drugs and to minimise the physical and psychosocial harms associated with drug use. While literature shows that identification with drug use plays an important role in both recovery from drug addiction and in predicting future alcohol dependence, its role in the pathway of on-going drug use is not as clear. In this study implicit identification with drugs was not found to play a causal role in transitioning to injecting or to independently predicting changes in drug-using behaviour over time. However, even though identification with drug use was not found to predict aspects of future drug use or seriousness of use over time, the results suggest that it may be a marker of drug-using behaviour as identification with drug use was shown to mirror ongoing drug-related behaviour. The intricate relationship that may exist between implicit identification with drug use, peer networks and entrenchment in a drug-using lifestyle should be further investigated to enable a clearer understanding of the possible role these factors may play in changes in drug use over time. Given the significant public health implications of regular drug use, and the particular risks associated with drug use among young people, it is important for future research to be designed around this *at risk* population that continues to investigate potential predictors of ongoing patterns of drug use in order to gain a clearer understanding of the different drug use trajectories for young *at risk* individuals.

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APPENDICES

Questionnaire

1) In the last 12 months, did you use drugs and if so how often?

Never used drugs	☐	0
Not in the last 12 months	☐	1
Once or twice a year	☐	2
Every few months	☐	3
About once a month	☐	4
Once a week or more	☐	5
Every day	☐	6

2) Have you ever injected drugs?

No	☐	1
Yes	☐	2

3) When was the last time you used drugs?

Today	☐	1
Yesterday	☐	2
Last week	☐	3
More than a week ago	☐	4
More than a month ago	☐	5
More than 6 months ago	☐	6
Never used drugs	☐	888

4) What was the drug you last used? (mark only one answer)

Heroin	☐	1
Cannabis	☐	2
Cocaine	☐	3
LSD	☐	4
Ecstasy	☐	5
Ice/crystal	☐	6
Speed	☐	7
Ketamine	☐	8
Benzos	☐	9
Methadone/bupe	☐	10
Prescription opioids	☐	11
Other	☐	12 _____

5) Have you used any of the following drugs in the past 12 months.
Tick as many as you have used.

Heroin	☐	1
Cannabis	☐	2
Cocaine	☐	3
LSD	☐	4
Ecstasy	☐	5
Ice/crystal	☐	6
Speed	☐	0
Ketamine	☐	8
Benzos	☐	9
Methadone/bupe	☐	10
Prescription opioids	☐	11
Other	☐	12 _____

6) In the last 12 months, what was the main way that you used the drug of your choice?

Smoked	☐	1
Snorted	☐	2
Swallowed	☐	3
Injected	☐	4
Other	☐	5
I did not use drugs in last 12 months	☐	888

7) Over the last months, did you ever think your use of drugs was beyond your control?

Never or almost never	☐	0
Sometimes	☐	1
Often	☐	2
Always or almost always	☐	3
I did not use drugs in last month	☐	888

8) Over the last month, did the prospect of not obtaining drugs when you wanted them make you very anxious or worried?

Never or almost never	☐	0
Sometimes	☐	1
Often	☐	2
Always or almost always	☐	3
I did not use drugs in last month	☐	888

9) Over the last month, did you worry about your use of drugs?

Not at all	☐	0
A little	☐	1
Quite a lot	☐	2
A great deal	☐	3
I did not use drugs in the last month	☐	888

10) Over the last month, did you wish you could stop permanently?

Never or almost never	☐	0
Sometimes	☐	1
Often	☐	2
Always or nearly always	☐	3
I did not use drugs in the last month	☐	888

11) How difficult would you find it to stop permanently or go without?

Not difficult	☐	0
Quite difficult	☐	1
Very difficult	☐	2
Impossible	☐	3

12) Have you either have a close call with the police or been arrested because of your use of dugs?

No	☐	1
Yes	☐	2

13) Have you lost your job or been in trouble on the job because of using drugs, or have trouble with teachers or school authorities because of using drugs?

No	☐	1
Yes	☐	2

14) Please answer the following statements from strongly disagree to strongly agree.

1. Using drugs is part of the way I see myself
   Strongly disagree 1 2 3 4 5 6 7 Strongly agree
2. Using drugs is part of “who I am”
   Strongly disagree 1 2 3 4 5 6 7 Strongly agree
3. Using drugs is a large part of my daily life
   Strongly disagree 1 2 3 4 5 6 7 Strongly agree
4. Others view using drugs as part of my personality
   Strongly disagree 1 2 3 4 5 6 7 Strongly agree
5. It is easy to imagine myself as a person who doesn’t use drugs at all

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

6. When I think of myself, I think of being “clean”
Strongly disagree 1 2 3 4 5 6 7 Strongly agree

7. When I think of myself, I think if using drugs
Strongly disagree 1 2 3 4 5 6 7 Strongly agree

8. When I think of myself, I identify with being “clean”
Strongly disagree 1 2 3 4 5 6 7 Strongly agree

9. When I think of myself, I identify with using drugs
Strongly disagree 1 2 3 4 5 6 7 Strongly agree

10. Using drugs makes me feel closer to my friends
Strongly disagree 1 2 3 4 5 6 7 Strongly agree

11. Using drugs makes me feel more confident or more able to talk in a social situation
Strongly disagree 1 2 3 4 5 6 7 Strongly agree

12. Using drugs helps me stop worrying about a problem
Strongly disagree 1 2 3 4 5 6 7 Strongly agree

13. Using drugs makes me feel better when down or depressed
Strongly disagree 1 2 3 4 5 6 7 Strongly agree

14. Using drugs helps me celebrate good events
Strongly disagree 1 2 3 4 5 6 7 Strongly agree

15. Using drugs helps me relax
Strongly disagree 1 2 3 4 5 6 7 Strongly agree

16. Using drugs helps me keep going on a night out with friends
Strongly disagree 1 2 3 4 5 6 7 Strongly agree

15) How many of your fiends use (but not inject) drugs at least once a month on average?

None of my friends	☐	1
A few	☐	2
About half	☐	3
Most	☐	4
All	☐	5

16) How many of your fiends **inject** illicit drugs at least once a month?

None of my friends	☐	1
A few	☐	2
About half	☐	3
Most	☐	4

All ☐ 5

17) How do you think most of your close friends would feel about you using drugs occasionally?

Don't know ☐ 1
Disapprove ☐ 2
Neither disapprove nor approve ☐ 3
Approve ☐ 4

18) How do you think most of your close friends would feel about you using drugs regularly?

Don't know ☐ 1
Disapprove ☐ 2
Neither disapprove nor approve ☐ 3
Approve ☐ 4

19) Are you?

Male ☐ 1
Female ☐ 2
Transgender ☐ 3
Intersex ☐ 4

20) How old are you?

_____ years

21) How old were you when you used illicit drugs for the first time

_____ years

I have never used illicit drugs ☐ 0

22) Highest Level of education?

Primary ☐ 1
Up to and including year 10 ☐ 2
Up to and including year 12 ☐ 3
Diploma/Trade ☐ 4
Attended/completed university ☐ 5

23) Main source of income ?

Full time work	☐	1
Part time work	☐	2
Casual work	☐	3
Contract work	☐	4
Benefits	☐	5
Student allowance	☐	6
Dependent on parents	☐	7
Crime	☐	8
Other	☐	9
No income	☐	10

Information sheet for participants

Places to get help if you need it…

ALBION STREET CENTRE

Here you can see a doctor to get a hep C test or any other medical services, including sexual health and help for drug use.
150 - 154 Albion Street, Surry Hills 2010
T: 02 9332 9600
W: http://www.sesiahs.health.nsw.gov.au/Albionstcentre/

YOUTHBLOCK HEALTH AND RESOURCE CENTRE

Here you can get support and information specifically for young people about general health, mental health, alcohol and other drugs problems
97 Church Street, Camperdown, 2050
T: 02 9516 2233

YOUTH OFF THE STREETS

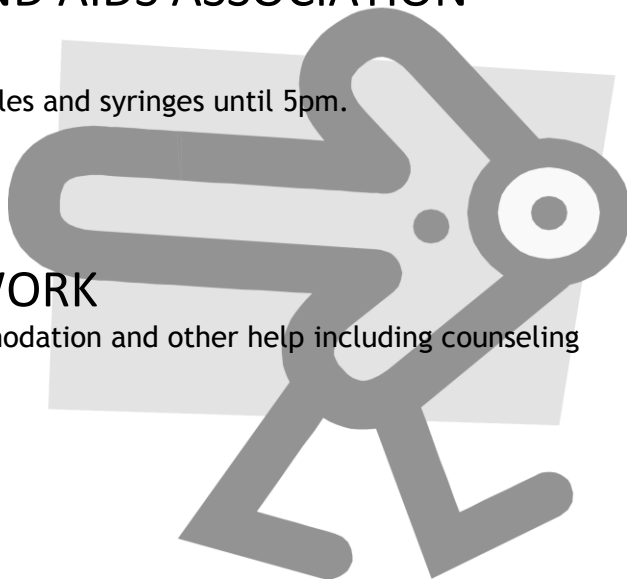
Youth Off the Streets can provide counselling and help for drug use and give you temporary emergency accommodation.
133 O'Riordan St, Mascot 2020
T: 02 9330 3500
W: www.youthoffthestreets.com

KIRKETON ROAD CENTRE

Here you can see a doctor to get a hep C test or any other medical services, including mental health, sexual health and help for drug use. You can also get free needles and syringes until 6pm Monday-Friday and until 1:45pm on weekends and public holidays.
Above the Darlinghurst Fire Station, entrance on Victoria Street, Darlinghurst 2010
T: 02 9360-2766
W: http://www.sesiahs.health.nsw.gov.au/sydhosp/services/kirketonroad.asp

NEW SOUTH WALES USERS AND AIDS ASSOCIATION (NUAA)

Here you can get help for drug use and free needles and syringes until 5pm.
345 Crown Street, Surry Hills 2010
T: 02 8354 7300 or 1800 644 413 (NSW only)
W: www.nuaa.org.au/



OASIS YOUTH SUPPORT NETWORK

Oasis can give you temporary emergency accommodation and other help including counseling and help for drug use.
365 Crown Street, Surry Hills 2010
T: 02 9331 2266
W: http://salvos.org.au/oasis/

Contact details for follow up survey

Can we contact you in three/four months times to complete another survey like this?

☐ No

☐ Yes. Please give your...

Name _____

Phone Number _____

Email _____

OPTIONAL

Contact details of a friend or family member (someone who can tell us where we can contact you if your mobile or email changes)

Please note that the only information provided will be that you participated in a survey for the University of Queensland on young people's attitudes and behaviours.

Name_____

Phone number_____

Email_____

Follow up contact Script to parent/guardian or friend

Hi (insert name),

My name is (insert name) and I work at the University of Queensland. (Insert name) completed a survey for us on the attitudes and behaviours of young people (insert time) months ago and provided your number/email if the contact details he/she left us changed.

We are about to conduct a follow up study and need to make contact with (insert name). Do you know the best way to contact (insert name) at this current time?

If you do not feel comfortable providing those details, would it be possible for you to pass my contact details (insert number/email) to (insert name)?

Thank you